Supplement to The Builder,

MAY 7, 1887.

GENERAL CONFERENCE OF ARCHITECTS.

THE EIGHTH* General Conference of Architects, held under the auspices of the Royal Institute of British Architects, was formally opened on Monday evening last, when the President of the Institute, Mr. Edward I'Anson, F.G.S., and the Council, held a reception in the West Gallery on the ground-floor of No. 9, Conduit-street. On the walls of the Gallery were displayed an interesting exhibition of drawings of works by the late Mr. George Vulliamy and the late Mr. Ambrose Poynter, as well as a series of rubbings of brasses lent by Mr. A. Oliver. The reception took place at half-past seven, and at eight o'clock the company proceeded upstairs to the rooms of the Institute, where the fifty-third annual meeting of that body was held. The annual report, of which we gave the salient passages in last week's *Builder* (p. 651, *ante*), was unanimously adopted, the new Council was elected, and other formal business transacted.

It may be mentioned that a few hours before the formal opening of the Conference, viz., at three o'clock on Monday afternoon, some two hundred members of the Conference visited the Stock Exchange, as enlarged and completed, where they were received and conducted over the building by the architect, Mr. J. J. Cole, and his son, Mr Langton Cole. We will say a little more about this building next week.

On Tuesday morning a party of about 150 members of the Conference visited the New National Liberal Club-house, Victoria Embankment, under the guidance of the architect, Mr. Alfred Waterhouse, R.A. They next proceeded to the large block of residential mansions in flats adjoining the new Club-house, where they were received by Messrs. Archer & Green, the architects. Next, they visited the new Hôtel Victoria, in Northumberland-avenue (lately known as "The Northumberland Avenue Hotel"). Here the visitors were met by Mr. H. L. Florence, of the firm of Isaacs & Florence, the architects of the building. Of all these buildings we shall have more to say next week. In the afternoon a party of about seventy-five members went by train from Waterloo to Egham, where they visited the Royal Holloway College, under the guidance of the architect, Mr. W. H. Crossland, who entertained the visitors at luncheon.

It was not until Tuesday evening that the Conference proper was actually commenced. The attendance, though large, was by no means so great as on some previous opening nights, owing, perhaps, to the numerous visits to buildings which preceded it. The programme, perhaps, was somewhat over-crowded in this respect, and those members who visited all the buildings named must have been tired out. The chair having been taken at 8 o'clock by Mr. Alfred Waterhouse, R.A.,

Mr. J. D. Sedding at once proceeded to read the following paper

ON THE RELATIONS OF ARCHITECTURE AND THE HANDICRAFTS.

"Watchman, what of the night?"

ALTHOUGH the relations of design to the handicrafts is of deep concern to us, and is likely as time runs on to become the problem of problems, yet there is much in the present state of things to hide it from the sight of such as care not to confront it.

So long as clever and interesting designs can be turned out, such as were seen in the photographs of modern buildings forwarded the other day to the Adelaide Exhibition; so long as historic art has the same enthralling interest for us, and for the young eagles we hatch that it has now; so long as her Majesty's mails afford us such cheap and ample facilities for keeping up our relations with the craftsmen who have the honour of more or less faithfully representing our ideas in the buildings we are rearing in various parts of the country; just so long may we evade this question if we will. It does not visibly obtrude itself in such peremptory fashion that we are bound to face it at once. We may keep our skeleton safe locked in the cupboard a little longer till we have more courage to face it.

The question is so new and unparalleled. We have kept it hitherto dark from the critics, who worm out most things; and there are possibly such ugly issues hanging to its tail that we are naturally disinclined to touch it. It is not that we are not a bit uneasy about things at times. We cannot but feel that, with all its merits, our design fails to correspond in many vital points with all good art that ever was. There are two ways of drawing a horse,—one starting from the head and the other from the tail; and though the first is undoubtedly the right way, it is not ours. We know that the old ways of art and the old methods of producing art are not our ways and methods. We feel, too, at times that life under the present system of conducting design is an irksome business,—nay, that the stress and strain of it have sent some of our best men into an early grave. Yet to pause and quietly take stock of things seems scarcely possible,—matters move at such a pace nowadays. The mill of Victorian design has had to encounter such strange antics of veering winds, the wheels have had to run so fast, the grain we had to grind is of such various kinds, and the people outside were so mad to get at everything we have turned out,—even before it was properly sorted or bagged,—that, really, what with the bustle, the confusion, the uproar, and the dust, we have had no opportunity for calm reflection.

And yet I will be bound to say you *have* had your opportunities for realising the march of things. We are all diligent students of old art, and old art is never silent to those who will hear. Perhaps, the occasion came in the well-earned pauses of a day's diligent sketching, when, shut in with Nature and her twin sister Art, away from the sound of the grinding-mill, within the precincts of some sequestered old abbey buildings, the desire came upon us to learn somewhat of the secrets of the strength of the old work and somewhat of the secrets of the weakness of our own work. What,—we have then asked,—is that quality in the architecture of old days that stamps it with inherent nobleness? How came it with that inimitable touch that gives it this lasting human effectiveness? From whence did the old men get that subtle alchemy which, somehow or other, seems to have been infused into the dead stone and wood which makes these old walls resound with ever fresh human interest? What is that specific something which is ever present in old design and always absent from new design? What was there in the manner of the making of the old detail that ensures its success, and what in the manner of the making of the new detail that bars its success?

Now the answer to all these questions is, I think, contained within the four corners of our subject. And as to this subject let me say that without wishing to push the significance of our conference upon it to-night too far, I cannot but accept the permission so kindly accorded to me of bringing it before you as witness that you consider it as timely a question as those other subjects down for conference of "Education," of "New Materials and Inventions," of "The Federation of Architects," of "The Registration of Architects."

Our relations with the handicrafts! Well, no one discusses his relations with his relations until matters are uncomfortable. No one chatters of the relations between the members of a family or of a body corporate unless old ties and interests are in danger. It were impossible to conceive of William of Wykeham or Alan of Walsingham, or Christopher Wren, or, Inigo Jones, discussing the relation of architecture to the handicrafts, even though the two last-named worthies were often seen with ominous-looking portfolios under their arms. And why is the notion so preposterous? Is it not that the leaders of design in those days were in active touch with the trades,—the two first-named in closer touch than the other two,—because the architect and the craftsman were not, as now, twain, but one? "So they two went, both of them together."

Now, I am about to ask you to let me treat this subject in what may appear a roundabout fashion: anyhow, it is the fashion in which my roundabout studies of old art have led me to look at it. You see, I assume at once that we must judge of it from an historic standpoint. The past of art elucidates the present: "What has been shall be." The past of art is prophecy as well as history. So I shall hinge all that I have to say upon these four propositions. 1. English architecture is not what it was. 2. The architect is not what he was. 3. The handicraftsman is not what he was. 4. The relations of architectural designer and craftsman are not what they were. In our treatment of these propositions I hope we shall find the key to the situation which causes us uneasiness. Only let me say now, what I shall desire you to remember when I have finished, that this hastily-compiled paper lays no claim to completeness, and makes no pretence to adequacy.

1. English architecture is not what it was,—not simply as regards *what* we do, but *how* we do it,—not simply as to the types we have or want, but as regards the initiative and character of design. Architecture under the conditions of these days is becoming more and more a thing of schools and classes, of geometry, of lectures, of manuals of design, of book illustrations, of criticism, of draughtsmanship and sketching, of classification and demonstration. No one will, I think, contradict me when I say that so far as architecture is now conducted as an art and a profession it means *design*, not craftsmanship. Let me give an illustration to explain my meaning. Suppose that a Tory Government, desiring to exercise a little art-coercion, were to pass a Bill for the extermination of all architects and architects' assistants throughout the land! What would happen would be that English architecture would simply lie with the architects dead and buried in the same grave. And if the Bill were to apply "for ever and ever," such English architecture as we have initiated would cease from off the face of the earth. But suppose that some ruffianly monarch had tried the same game on the Innocents of old days, what would have happened? Why nothing would have happened. The effect upon English architecture would have been simply *nil!* because the handicrafts would have carried on things exactly as they had been before. You might as well expect to stamp out the English language by putting to death the professors at the Universities.

Old architecture is craftsmanship or it is nothing. The thews and sinews of old design were in the trades. Old architecture was not what modern architecture is, the creation of the architect's office; it was the creation of the workshop: the workshop was its home, the

---

* The first of these Conferences was held in 1871, the second in 1872, the third in 1874, the fourth in 1876, the fifth in 1878, the sixth in 1881, and the seventh in 1884. Copious notes of the proceedings will be found in the volumes of the *Builder* for the years named; and this year, as we did three years ago, we report the proceedings in special Supplements, of which this is the first. Our second Conference Supplement this year will be given next week.

tradesman's bench was its cradle, tradition was its foster-mother. The momentum of old art came through the trades. Its inspiration came direct from the heart of things, and there were no mediums in the shape of draughtsmen, with their *abracadabra* plans and sections, that prevent the night-watches of the honest British workman of to-day. Old architecture is not like the new, a fortuitous concourse of atoms; in spite of its wide range and free developments it was, in truth, a compact homogeneous whole, where nothing appears suddenly and without preparation, and nothing disappears until it has played out its part and fertilised the ground for that which takes its place. The style of old architecture is far-reaching tradition. It was nurtured on the sustained enthusiasm of successive generations of tradesmen. It was developed sympathetically and coincidently by men who in their handling of things could maintain firm hold on the past, yet keep their developments so closely neck and neck as almost to suggest the existence of a sort of art-telephone by whose aid the schools of workmen far and near were made aware of the tune going on, so that all alike could be simultaneously working at the same theme or *motif*, yet without restraint to local genius, or prejudice to local necessities.

Old architecture was, above all things, local in its practice and development. Its strength was to sit still. It was not, as ours, an art of excursions,—an art carried out by architects always on the wing, who, like Ulysses, after his long roaming, can say,—

"I am a part of all that I have met."

Old detail was applied by the craftsman who invented it, and was not drawn out by a draughtsman situated, it may be, hundreds of miles from the building being erected, who could have nothing in common with the workman, and no other mode of communicating with him than her Majesty's mails supply.

Old detail was the product of a fertile field. It passed through the brain of a horny-handed workman, deep skilled in the lore of the trades, and rich with the mellowed harvests of bygone days. It did not, like modern detail, owe its origin and such charm as it possesses to the volunteer notions and precocious maturity of some masterful soft-handed occupant of an office-stool, whose practical knowledge may not always equal his aspirations.

In regard to this matter of the propagation of architecture by schools of workmen, I will trouble you with a few illustrations taken from British examples, as I wish to trace things home to ourselves to-day.

The effect of the old schools or gangs of workmen is seen in two ways,—1. By the distinct types or varieties of types that prevail within a given area; 2. By the recurrence of similar or identical details in distant structures, which marks the wanderings of gangs who carry along with them the mouldings or plans used by them at their last or previous jobs.

Mr. Street, in his masterly report upon Christ Church, Dublin, incidentally mentions an interesting example of this in the splendid abbeys of the counties of Cork, Limerick, Tipperary, Kilkenny, Wexford, Meath, and Down. He says, "It is not as works of art worthy of attentive study that they interest me so much, as the way they illustrate the manner in which art was carried from land to land in the Middle Ages. The feature in question is this,—I find in these buildings the most unmistakable marks of their having been erected by the same men who were engaged at the same time in England and Wales." Of Christ Church, Dublin, and St, Canice's, Kilkenny, Mr. Street observes, "These two churches possess certain features so peculiar and so exactly like what we see in St. David's, Llandaff, Wells Cathedral, and Glastonbury Abbey, that they *must* have been erected by the same troop of workmen, and from the designs of the same architect."

It was, I may remind you, to Mr. Street also that we are indebted for the discovery by internal evidence that Stone Church, Kent (which he handled so ably in his restoration) was the handiwork of masons from Westminster Abbey.

We must all, in the course of our studies or professional work, have come across instances of the same kind. I will give a few that have fallen under my own observation. To cap that of Mr. Street's, I may say that I find the handiwork of the builders of Sherborne Minster in Crewkerne Church. Again, Tideswell Church, Derbyshire, is a remarkable specimen of fourteenth-century work. We can plainly trace the Tideswell arcades, windows, doors, and porches in Chesterfield Church, erected later on; and I can further run these identical features to ground at Tamworth, some long way off.

Of the repetition of the same designs and details in the same county, I may mention how the noble Perpendicular towers at Isle Abbots, Huish Episcopi, and Bishop's Lydeard, Somerset, are so exceedingly alike that, were it not for their different surroundings, you would not from your sketches of the three be able to tell "t'other from which."

Speaking of this county, I may recall to your recollection how a gang of Somersetshire workmen put up a completely typical Somersetshire tower at Llandaff Cathedral in the fifteenth century. Further, that another gang of Somersetshire masons built Wadham College, Oxford, in the seventeenth century.

Perhaps it may not be out of place if I here venture to give as my opinion that the vast majority of our parish churches were both designed and built by schools of workmen. To me they represent peasants' art. They are local, not only in regard to conformity to certain types, but local in the thought and character expressed in them. They are of the soil, and made by children of the soil. While the stone of which they are built was quarried in the field hard by, the ideas they clothe were quarried out of the no less home fields of the local peasants' brains. And, for my own part, I like to feel that just as the Gospel preached within the walls of our parish churches had its peasant apostles, so the art proclaimed in the walls had its peasant apostles; and I am no less the humble disciple of the one than of the other. What little I know of art I have mostly got at the feet of the humble, but immortal, peasant craftsman of olden times. The critic, who is 'cute or nothing, tells us that the marks of irregular composition and crude handiwork found almost invariably in Gothic buildings are essential to the style, and that they are there because they were purposely put there, forgetting that these traits are but the accidents of the work which are found equally in Roman or in any other phase of art where the culture of the workman tallies with this case. It were best to drop such theories, and to see in the simple *naïveté* of these buildings, and in the unexpectedness of their composition, only the state of the handicrafts of the time. Art has its undress as well as its full dress Academy costume, and here we have but the product of men whose invention was in their finger-ends, whose imaginative grasp was not great, who were ignorant of the rules of selection, and whose work,—delightful and elevating though it be,—has none of the distinction and the *Atticism* of fastidious times. Were architects employed to design our village churches? I doubt it. But if so, methinks that the British architect of the present day has something to learn from them of the beauty of simplicity, and of the value of restraint in design.

The strongly local flavour of old architecture is, I say, an indirect testimony to the community of effort and art-motive. The distribution of plants and birds in a locality is not more marked in England than the distribution of types of old-world design and handiwork. If the botanist can tell us where to find the bee-orchis or the *Osmunda* fern, or the ornithologist can tell us where to find the stonechat or the turtle-dove, we architects can tell them where, and where only, certain architectural types are to be found. Nay, we can tell them the marks of borderland influences,—how differences exist, and yet the identity of the original types will still be preserved. We can tell them how a Sussex tower differs from an Oxford tower, and a Derbyshire tower from both. I remember tracing the likeness of the tower of St. John's, Cardiff, to the tower of Gloucester Cathedral, and I found afterwards that the living of the parish was still in the gift of the Gloucester Chapter; so that goes to support the theory that the same gang of masons built both.

Again, we can tell almost by the feel of an enriched bench-end whether it be the work of the tribes of Somerset, or Devon, or Cornwall. Show us an oak chest in Wardour-street, and we can tell in what county it was produced. We can tell at a glance whether the tracery and make of a church screen be of Welsh, Yorkshire, or Norfolk origin. I once went a long journey in the wilds of Cornwall to see what Murray calls "an elaborate screen," and I remember my disgust as I pronounced at a glance that the thing was of Midland County origin. My instinct was right, but it was proved right in a manner I did not anticipate, for later on I broke blade after blade of my friend's knife over the tracery, which, though looking like oak, was in reality Brummagem cast-iron!

Here are a few other testimonies of local schools of art shown by the presence of one type and the absence of another. Thus the barrel roof is the only existing type of roof in Cornish churches. In Devon the type exists, but in a less degree; in Somerset it exists, but in a still less degree. In the churches of these three western counties there is, again, the same peculiar continuation of the nave aisles to the full extent of the chancel, and the aisles almost always have pitched roofs. There are only four instances of clearstories in Cornwall,—at Callington, Lostwithiel, Fowey, and North Petherwin. Again, in Cornwall, I know of only two chancel arches,—at Bodmin and at Towednack.

And so with other features elsewhere. If you draw a line from Newmarket to Fen Stanton there is a preponderance of towers over spires in the proportion of nearly ten to one; while at that village the character changes, and were a line drawn from thence through Huntingdonshire and Northants into Rutland, a tower would scarcely be found. From the same School of art influences Oxfordshire houses get their gables and Northamptonshire houses their special type of chimneys. Such methods of local developments of types conduced to the growth of individuality of character.

Another special phase of architecture is that where local types are temporarily coloured by foreign influences. This phase is, of course, represented in a wholesale degree in Spain under the Moor, or in Flanders under the Spaniard, and oddly, too, in Spain when the Spaniards evacuated their diggings, but took Flemish tricks of building away with them. The Flemish stepped-gables, for instance, crop up in Spain. But we must not wander from England, and I will only note two examples here. There is the strong influence exerted over Norfolk and Suffolk art after the wealthy traders had imported Flemish craftsmen to those parts. Again, my rambles in Devonshire have enabled me to trace the work of a small gang of sixteenth-century Flemish carpenters over that part of the country that lies south-west of Kingsbridge-road Station. Their work is to be found in the screens of several churches in that neighbourhood. The "grand climacteric" of the school was arrived at in the side chancel screens at Holbeton, but I found their work also at Chivelstone, Kingsbridge, and Ugborough. The work is singularly beautiful, and it loses none of its interest by the admixture of foreign and local characters.

2. The architect of to-day, I said, was not what he was. In touching upon this point I shall say as little as I may upon the vexed question of the functions of the architect in old days and to what extent he corresponded with ourselves. I am led to think that from whatever source the general scheme of a building came,—whether from patron builder, architect-builder, or master-workman, whether the building were church, castle, country-house, monastery, or cathedral,—the details were left pretty much to the trades.

That the names of architects are not connected with the traditions of old English buildings does not necessarily imply that the people of the place were unconcerned about the history of their buildings, but it implies, I think, that their erection was a joint-stock affair. Even in Italy,—where one would suppose from books that art was the great business of life,—even there Vasari has to note to how few, especially of the notable earlier buildings, he can assign an architect's name. The reason he gives for this is the then modesty of the profession! He "cannot but marvel at the simplicity and indifference to glory exhibited by the men of that period." Now although one feels that for me to "differ" from Vasari almost parallels the old woman who "differed from Paul," yet in spite of this, and in spite of seeming to rob the profession of the merit of a virtue they can ill afford to lose, I do venture to think that Giorgio Vasari was on a wrong tack here. Is it not a singular fact that whenever a *foreigner* has anything to do with a building,—a man, that is, who is not of the

crowd of local craftsman,—we are sure to hear of him? Thus we hear of Buschetto, "the Greek," at Pisa, of Master Harduin, at Bologna; of Wilhelm of Innspruck, at Orvieto; of Maestro Jacopo the German, at Arezzo; and so forth.

But what I particularly desire to emphasise here is the little influence the foreign architect can exert when his sympathies run counter to those of the craftsmen. How different is it now! The ground-plans of the churches, their proportions, their roofs, and their traditional features remain as before, in spite of the foreign "boss." It is only in the window traceries and the form of the arches that he makes any appreciable mark. One swallow does not make a summer. And so Messers Giovanni and Tommaso and the rest of the brown-faced workmen complacently smile at the foreigner as he shakes his shaggy locks and rolls out his Germanic oaths: they know that the running is in their hands. Gothic is queer stuff to them, but they know that Gothic is not Gothic when smothered in Classic clothes from top to toe. And we know it too.

To revert to English work. I would, for the purposes of this paper, divide English design into three phases, each phase representing a different relationship or degree of relationship to the crafts. 1. There is the art which ranges from the earliest times down to the Classic Renaissance of the sixteenth century. 2nd. The art which ranges from the introduction of the Classic to the Gothic Renaissance of this century. 3rd. The art which represents the Renaissance of the Gothic and of the Renaissance now going on.

The first phase expresses more exactly than the second what is the true native style of the English people. I do not say that it is the better or the worse for that. The second phase is English enough, yet English with a difference. In the first, or Gothic phase, we have art as it sprang spontaneously into existence, fresh and untarnished from the rock of the genius of the people, and here architects,—who in the history of English architecture have mostly been employed as translators,—were a superfluity, except in a big effort. There was no call for the translator in the development of the Gothic: it was the common people's language.

In the second phase we have a certain interference with the methods of origination,—a certain tampering with the springs of design at their source. There are, as you know, two sorts of interference with deep-rooted design,—the accidental and the wilful. Interference like that of the Moor in Spain or the Spaniard in Flanders was accidental. But the interference that I now speak of was wilful,—and here, as was the case with the Gothic revival, it was carried out by "superior persons." Men travelled more, and discussed and desired to reproduce at home what they had seen abroad. The influences of travel and culture upset, as far as they could, the traditions of the workshops. Kings and courtiers, scholars and churchmen, cast their eyes about them abroad, and when they got home threw in all the weight of their wealth and patronage to uprear the new Classic. Naturally enough the situation demanded the professional services of masters of design, like Holbein and the ubiquitous John Thorpe. At first, I suppose, you could have counted "the profession" on the fingers of one hand. But there were brighter days in store. Gothic churches might be designed and built, as we have seen, by peasant tradesmen, but not so Elizabethan mansions. These must have some of the grace and elegance of the buildings from whence their *motif* came. You will, I think, agree with me that the Elizabethan and Jacobean styles need wealth to build, and refinement to design, or the quality of dignity essential to their proper representation is absent. They represent Academic art, courtly art, an art of distinction and selection. Renaissance art needs a well-furnished mind, learned in literature, apt at Classic allusion and at rendering antique symbolism. Here clearly is an art that demands the professional services of an architect.

Now, the point I am coming to is that, in spite of the difficulties of the situation as regards the character of the architectural design then needed, and in spite of the disparity of culture of the designer and the craftsman, their relations are entirely pleasant and friendly. The common workman is not ousted from his old place in relation to the initiative, or, at all events, to the *development* of design. Design did not all at once begin, as it did with us at the time of the Gothic revival, to be *paper* development. Of course, you may explain the situation by reminding me of what I know already, that the designer then was only a specialist, and specialists are never up to much! You may say that the architect or the patron-architect knew precious little about details, and so left the workman to supply his deficiencies. But that does not cover the whole case. Even a specialist may be a master, too, occasionally.

What we may infer from observation of the Early Renaissance work is that, by some means or other, Tom, Dick, and Harry, who had "allers done Squoire's work," were made acquainted with the round arch, pilasters, balustrades, and friezes, and they took kindly enough to them and worked "overtime" in the evenings, scheming fresh planes for "them tricksy new-fangled mouldings." But the Classic imagery stumped them, as we see by our old country houses to this day. Here was clearly a case for calling in their betters.

But while things moved so sweetly in the yards, the "superior persons" who wrote about art were not content. We all know, and like no less, that dear old pedagogue John Evelyn's "Parallels," which, as you may remember, also contains the significant "Explanation of certain *Terms* particularly affected by *Architects*," which looks very like making architecture an exact science. In his Apology for antient Architecture, Evelyn refers with something like scorn to the "simple workmen, whose trade dwells all upon their finger-ends only. But, says he, "we shall not appeal to such arbiters as these; there are others to be found that, having their first studies well founded on the principles of geometry,"——we know the sort of thing that follows.

The architects of those days, however, were not going to be led by the nose by the "superior persons." They were not going to kill the goose that laid the golden eggs. The "simple workmen whose trade dwells all upon their finger-ends only" had an honoured and a conspicuous place in the making of English Renaissance design. The architect did not swamp the craftsman or destroy his individuality, or play the masterful dictator by putting a clause into his specification to the effect that "No moulded work, or work involving the design of the architect, to be put in hand without previous application to him for, and supply by him of, the necessary full-size and detail drawings."

This piece of supreme folly and suicidal presumption it was left for the architect of the nineteenth century to inaugurate.

Time and your patience would fail me were I to go properly into this phase of the subject, or to show how even an old stickler like Thomas Tresham lets the workman work his will, as where, in the Triangular Lodge, he lets the local mason put in the local crocketed gables seen in Perpendicular work at Higham Ferrers; or, at Rothwell and Lyveden, the familiar Tudor features of angle staircases, ranged heraldry, bay windows, &c.

To see concisely and easily what were the relations of the architectural designers and craftsmen we cannot do better than go to Oxford. Take such work as Fox's at Corpus (1516), or Wadham (1613), or Pembroke (1620), or the various phases of Renaissance at St. John's, including Inigo Jones's inner quad. (1635). And what I would ask you to specially notice is that all the work,—in spite of its Classicisms,—is as *Gothic* as New College, as fully *local* (barring a Somerset touch in Wadham) as Merton or Magdalen, as fully *English* as it well could be. It matters not the date of the Oxford buildings, they are *Oxford work*. The door to the qualities of all alike open to one master-key. The big-sounding architects' names attached to their initiation do not count for very much. Old architecture, as I said, is craftsmanship or nothing, and this proud city of learning is indebted for her architectural triumphs, whose fame is in all the world, to the "simple workmen whose trade dwells all upon their finger-ends." Verily, there is a place in the exercise of our craft for learning, geometry, and refinement just as there was a place for the polished weapons from Saul's armoury in the battle against the Philistines, but none the less is there a place for the native invention of the local genius with his five smooth stones out of the brook of common local art. Saul may slay his thousands, but David,—said the singing women,—his ten thousands. Even Inigo Jones, with his big name, big individuality, and big reputation in "the profession" submits like a man to the embrace of the genius of the place, and lets the local handicraftsman have his say in the details, even to the plumber who made those magnificent stack-pipe heads you and I have sketched and tried to reproduce.

Of the art of the third phase of this section of my subject,—the art of the Gothic and other revivals,—I need only say, at this moment, that these revivals arrested workshop traditions. The revival was also a revolution in which the poor decrepit handicrafts which represented tradition went to the wall; and the Voltaire of the revolution,—the writer who with his pen shook down the whole fabric of tradition by appealing to the individual's own sense of beauty,—was Mr. Ruskin.

My next point (3), that the handicraftsman is not what he was,—in skill, practical knowledge, design, or imaginative talent,—needs, alas! but little argument to prove.

In judging of the architecture of old days,—say of Italy in the fifteenth century, of England or Germany in the sixteenth century,—you do not look merely at the plan or scheme of the buildings, but at their fittings and furniture inside. The bare walls are but the frame for the picture, the casket for the gems inside. In other words, we look at what is being turned out by the craftsmen all round. The touch-stone we apply to test the merit of a nation's art is the condition of the trades. We go to the minutiæ of the mason's, carpenter's, smith's, weaver's, painter's, plasterer's work to tell us the state of architecture. On visiting an old house the stamped leadwork on the waterbutt at the door that the vine-leaves will soon shroud from sight, the big stack-pipe head that two families of sparrows have appropriated during this long bout of dry weather, the moulded door, the brasswork on the mantelpiece, the clock, the panelling, the plaster ceiling, the chairs, grates, staircase,—in fact, everything your eyes light upon, bears witness of the then state of architecture. It is different now, when the British matron has to go for her home treasures to Tottenham-court-road, or when the British parson has to yield himself a prey to the blandishments of an eminent Birmingham firm or to the eloquent self-adulatory notices of the Barnum of the West.

Of course the handicrafts and architecture went to the wall together, and were both in an equally bad state at the end of the eighteenth century. The handicrafts will not prosper without proper encouragement and proper nurture: and the humdrum existence, the bad wars, the niggardly art-patronage, the mechanical utilitarian spirit, and the Quakerish religion of the times, all contributed to their downfall. Think of the Dutch doll-houses people had the face to put up then! See, too, what Puritanism had done for England when the relations of art with religion were represented by some such entry in the churchwardens' account as this:—"To altering the Commandments, to mending the Belief, and to making a new Lord's Prayer, 4*l.* 10*s.*"

Now, in making this broad and not very complimentary statement about the handicraftsman of to-day, I blame him not. I pity him from the bottom of my heart; for I know how the stars in their courses have fought against him. The domineering architect, the scornful critic, the capricious public, the steam-joinery builder, all these and many more things are against him, and all have contributed to degrade him. But when the parson explained to the rustic the three causes for a certain thing the latter forcibly remarked that "A hog h'aint got three fathers"! So here there must be one great cause for the downfall of the craftsman from the high estate he held in better times, which I have done my best to bring before you: and I take the root of the mischief to be this,—the lack of definite art-types. No trades can exist,—no, and no architecture can live,—without these. Workshop traditions were everything to the trades in old days, and nothing lasting can come out of our design till the workshops again have their stock-in-trade of types. The trades live only by the circulation of good, stable art-*motifs* and types. These are their life-blood. Check their flow and the trades languish; stop their flow and the trades die.

Now I have dwelt upon the Classic Renaissance thus long and fully so that I might be the better able to point a moral for ourselves in our conduct of the Gothic and Renaissance revivals now going on. And there is quite

enough similarity in the conditions of the times which saw their inauguration to warrant comparison. Each came on the heel of a decrepit art that after a process of soft autumnal dissolution was now seemingly at its last gasp. Each found a ready welcome from art patrons and designers. Each found the world eagerly looking for it as a sick man looks for his tonic.

There has been a tendency lately to speak disparagingly of the Gothic Revival. Too often have I been guilty of this, because one had a vague idea that the Gothic revival slew traditional art and ruined the handicrafts. But this is scarcely fair. To be honest, there was nothing that was necessarily destructive to the handicrafts in the mere revival of the Gothic. Nor was it the Gothic revival that did the mischief, but it was the idiotic, needless, abominably selfish way in which it has been conducted. The Gothic revival has been a glorious boon to paper design, because paper design was all we architects cared for. The carrying forward of the Gothic revival has been no boon to the handicrafts, because it was not our game to make it so. The craftsmen went down as the architect went up. The Classic had been an effective tonic and stimulant to the decrepit Gothic of the sixteenth century, because the tonic reached the right persons: and the Gothic was not an effective tonic to the decrepit Classic of the nineteenth century, just because it didn't reach everybody, and was only applied to the paper designer and not to the handicraftsman.

I now come to the fourth point,—The present relations of architectural design to the handicrafts. When I approach it, and ask for myself and for you, "Watchman, what of the night?" I am bound to say that I dread a too candid reply. Of course, we are accustomed to carry on design in such a grand, creative, cosmopolitan sort of way, that some may resent even the notion of inquiring as to the march of things. The view from this Olympus of ours at Conduit-street, cold and bare though its top be, brings home to us a sense of being monarchs of all that we survey. The very photographs sent to the Colonies demonstrate this, and I am sure the natives will have sense enough to see it too. But in a Jubilee retrospect of English architecture, we should have to go farther afield, and note such noble works as Barry's Houses of Parliament, Scott's Colonial Offices, Burges's Cork Cathedral, Street's Law Courts, Shaw's "Adcote" and his "Alliance" offices, Waterhouse's Manchester Town-hall, Pearson's Truro Cathedral, Bodley's Hoar Cross Church; to say nothing of Morris's manufactures, that have done more for the workshops and the home arts of England than the efforts of all paper-designers whatsoever.

We know, then, how great is our inventive power: yet if we may dare to be honest, we must own that this gorgeous garment of Victorian art is, after all, but a patched-up thing. Its tricky devices, delightful though they be, show no community of art-motive and effort in the troop of the designers; the designs are anything but all of a piece woven through and through. Ah! what waste of brain-tissues is here! What specious success does not this art represent! In what an abnormal state must design be to admit of such concoctions! Yes, verily,—

> "The time is out of joint; oh! cursed spite,
> That we were born to set it right."

At the outset I hinted that our relations with the craftsman who, at our various works throughout the land is extinguishing himself as he distinguishes us, and emphasising our individuality at the expense of his own,—our relations, I said, are only such as her Majesty's mails supply. In other words, we are dictators, and the craftsmen are our humble slaves. Designers are completely out of touch with the trades. Design has run miles and miles away from the knowledge and sympathies of the craftsman, and that clause in our specifications which forbids the execution of any work "involving the design of the architect" signifies that we mean to keep him exiled where he is. Whether we shall ever get things back to their normal state is more than I can tell; perhaps English architecture, with its steam joinery works and architects' offices, forming one grand department of science and art, may "bust up" before remedial measures are applied at all.

My closing words shall be a summing-up of the lessons of the situation, and these I put for the sake of conciseness under the head of fallacies that seem to me to underlie and take the heart out of all our modern efforts in design.

Fallacy No. 1.—That museums, exhibitions, schools of art, sketching excursions, manuals of design, photographs of old art, will regenerate the dead handicrafts of England. However these may stimulate the design of designers, I cannot see how workshop types can spring from such agencies.

Fallacy No. 2.—That the multiplication of able designers will regenerate art. We have too many eagles among us already, it seems to me, and too few wrens. The lessons of South Kensington upon this head should not be lost upon architects. Nothing could be less true than that the triumphs of old art were won by paper draughtsmen.

Fallacy No. 3.—That steam joinery is art. I have no faith in that "kittle o' steam" that is fast enabling the builder, with the devil's help, to all but dispense with the services of the tradesmen.

Fallacy No. 4.—That art can be developed by means of our paper designs. Development means freedom to adapt and to combine during the processes of making a thing, freedom to bring a familiar type to perfection by easy stages and "happy thoughts." We never can attain good lasting results by setting men to work in the types of styles of which they have no familiar knowledge and with which they are out of sympathy. Now, whatever your views may be about current politics, there is one point in regard to this matter of workshop union of design and handicraft where you, Sirs, will certainly agree with me, and that is that Home Rule is better than Coercion.

Fallacy No. 5.—That somehow a vernacular style will spring, Phœnix-like, from the ashes of our present topsy-turviness. There is nothing in history that warrants the opinion. It requires an inconceivable miracle to make licence into law. It took a God to bring order out of chaos.

Fallacy No. 6.—That adequate working designs can be expressed on paper. Possibly so, yet to me the incidental in old art is its chief charm. To fasten an able craftsman down to strict adhesion to some feeble effusion from an architect's office is to degrade the man. Fancy the Heckington Sepulchre, or the Antwerp Well, or the Hampton Court gates, being evolved out of paper designs and working drawings!

Now, at the bottom of all these fallacies is the one great cause of the lost relations of architecture and the handicrafts. We are bidden by the lessons of history, of old art, no less than by our common sense, and the convictions of our own hearts, to return with all the speed we may to the old fraternal relations of designer and craftsman. The rift in the lute has been too long active to be mended all at once, yet there are obvious ways in which remedies may be tried, and the music of English art regain its sweetness. For architects to cultivate, each one for himself, at least some one branch of the handicrafts, that is one way. To make ourselves and our pupils familiar with the insides of workshops; possibly to turn architect-builders ourselves, or to ally ourselves with trusty builders whose staffs of workmen shall get to know our types and methods,—these and many other ways may suggest themselves to you. Granted that the desire is present in our minds, that the Brotherhood of Art is a flesh-and-blood reality to us,—granted that the claims of the Esaus and Ishmaels, whom we have driven into the wilderness, are before us,—"Love will find out the way," as the old song says, to help him.

But let my last words upon the relations of architectural designer and craftsman be the golden words of the great Master Himself,—

"He that is greatest among you, let him be as the younger: and he that is chief as he that doth serve."

In the discussion which followed, Mr. Brett (the landscape painter), Professor Kerr, Mr. E. C. Robins, Mr. Walter Crane, Mr. William White, F.S.A., and the Chairman took part. A report of this discussion will be found in another portion of this week's *Builder*.

At Wednesday afternoon's meeting,

Mr. Arthur Cates, who occupied the chair, prefaced the reading of the paper on "Education" by a few remarks. He said that the subject to be considered at that meeting was the most important allotted for the consideration of the Conference. The burning questions of "Federation" and "Registration," which were to be considered at succeeding meetings, were less important to the well-being and prosperity of the profession than this vital one of education, which must largely influence any decision upon either of the others. At former Conferences and ordinary meetings of the Institute, this subject of education had in various phases been fully discussed. The systems adopted in Continental universities and fine-art academies had been fully explained, but little progress had been made towards establishing any systematic course of education which would provide a sound and extensive foundation on which the young architect might build up that superstructure of professional knowledge necessary for the successful practice of his art. The obligatory Examination established by the Institute had done much to point out to the student the extent of the knowledge which should be acquired; and the course of study required to be gone through by the candidate to enable him to pass had been highly benefical in its results. And when, in future years, the standard could be raised, he anticipated from such obligatory Examination, the happiest results in advancing the status of the profession. The chief difficulty with reference to the present Examination arose from deficiency of preliminary education, a want of training in mathematical and geometrical accuracy, and generally an absence of precision and exact knowledge in those technical subjects a thorough acquaintance with which lay at the root of an architect's success. But here they had no exact course of study which could be followed by the student as a certain guide for his education. There was a very large amount of educational opportunity available in London and in various centres throughout the country, but as yet there had been no uniform action, no combination of power and opportunity, nor had any definite guidance been as yet offered to the student who, either unaware of the opportunities within his reach, or bewildered by their number and want of organisation, was too often content to limit himself to office work, or, if the artistic spirit was strong within him, to devote all his energies to brilliant sketching and design before he had mastered even the rudiments of either of the scientific or artistic branches of the profession. A committee of the Institute had been for some time engaged in the consideration of this special matter, and would, he hoped, succeed in producing a students' text-book, which would bring all this scattered information into one hand-book properly arranged for the guidance of the student; but on the other side of the Atlantic a great advance had been made in this direction. In No. 9 of the "Journal of Proceedings," for February 17 last, there was an interesting notice of Mr. Richard M. Roe setting out recent particulars respecting the position of a Diploma in Architecture in France. Mr. Arthur Hill, of Cork, from whom they would have a valuable communication that afternoon, supplied detailed information respecting the curriculum of education for architects at the Massachusetts Institute of Technology at Boston and at the Columbia College, New York. Mr. W. H. White had supplied similar information respecting the course leading to the degree of Bachelor of Science in Architecture at the Cornell University, Ithaca, New York. This information deserved careful study, and had, he hoped, received attention from most of those present. With reference to the curriculum at the Cornell University, they had the advantage and honour of the presence at the Conference of Professor Babcock, by whom that curriculum was arranged. That gentleman, in order to aid and assist the consideration of the subject, had not only kindly undertaken to prepare a paper, but had hastened his departure from New York by some days in order to be present at the Conference, and personally favour them with his advice,—an act inspired by generous feeling for which their warmest thanks were due to the learned Professor (applause). The papers to be read that afternoon would necessarily be short and closely confined to the subject treated, in order that ample time might be allowed for discussion. The papers might be divided broadly into two groups, one dealing with the curriculum which should be followed in the education of an architect, and the means by which such curriculum might be established; and the other with the not less important question of the position which the Institute should take in reference to education;

and the results that influence must have in aiding that knitting together of the scattered members of the profession, and in helping Architecture to take its place in public estimation as a recognised profession, like Law or Medicine. The result of that afternoon's discussion would, he hoped, be to materially advance both objects, and he trusted that they would not separate without taking some steps towards their realisation.

Professor Babcock (Cornell University, U.S.A.) then read the following paper:—

A COURSE OF INSTRUCTION IN ARCHITECTURE.

MAY I not assume, in the presence of the educated gentlemen whom I have the honour to address, that the question of the *desirability* of educating young men specially for the profession of architecture, is one that needs no discussion? May I not take it for granted that a *technical* education is necessary in order that architects may keep up with the times? They must have a knowledge of art, of science, and of certain mechanical and trade work. How can that knowledge best be acquired? Will the young man get it most readily and thoroughly in an office, through the casual and hurried hints of his employer and the directions given by the chief draughtsman, supplemented by such reading as he can find time for? Or in a proper school, under skilled teachers, whose sole business is to instruct?

I will not waste your time by arguing in favour of technical schools of architecture, and I can say nothing against them. Across the Channel there seems to be no doubt as to their utility; and in the United States, whence I am summoned to address you, there are at least three flourishing schools, parts of large colleges, each with a curriculum extending over four years, and attended, altogether, by about 150 students. Your invitation to read a paper here on the subject of architectural education came to me so recently that I had no time, before preparing it, to learn whether it would be most agreeable to you that I should state the *raison d'être*, or the *modus operandi*, or the practical results, of special training, in special schools, for our particular profession, or consider the possibility of teaching our art at all in such a way as to make it worth while for the student to spend the time and money required for a systematic study of it. I could readily fill up the time allotted to me with my views on any one of these points.

I think, however, that I can most profitably discuss that part of the whole matter, which I have had occasion to work out in detail, viz., the subjects of instruction that ought to be included in "A Course in Architecture," and the extent to which each one should be pursued. The courses now prescribed in the American colleges referred to have been printed in your "Journal of Proceedings," so that you have the opportunity of examining their arrangement and details, and of comparing them with one another. I will not take any one of them as a model, but rather state what seem to me the important things to be included in any such curriculum, and the best way of treating them.

The object of a course in architecture should be, if I may quote from the register of the institution in which I am employed, "not merely," it might perhaps better be "not chiefly," "to develope the artistic powers of the student, but to lay that foundation of knowledge without which there can be no true art." Architecture is a fine art, based upon a mechanical art. Before the architect can become a true artist he must be master of the art of building. He need not be, ordinarily he cannot be, a mason or a carpenter, or a stonecutter. But he must know how to design good masonry and good carpentry, and be able to pass judgment upon completed work.

He must also, to meet the demands of the present time, which in the main are just, be a man of science; that is, he must know the scientific principles of buildings, the laws of mechanics to which structures are amenable, and the application of those laws in designing architectural structures. Then there are certain trades whose work is commonly essential to the comfort or protection of buildings, and which he must therefore condescend to recognise, such as painting and plumbing. The latter, if one may judge from the prominence given to it in architectural journals, is of immense importance. There was a period, just ended, when, on both sides of the Atlantic, it might have been inferred, from the leading articles in some of those papers whose special function it is to disseminate a knowledge of architecture and the allied arts, that the one thing that the student should acquire, and the aged practitioner, too, if his early education was neglected, is a knowledge of traps, their nature in general, their particular forms, their uses, the materials of which they are composed, the mysteries of their operation, the derangements to which they are liable, and the dangers that lurk unseen in their hidden depths. When these and some other matters are disposed of, the architect may turn his attention to designing, which is his particular art.

Let me state the proper subjects of study under the following heads:—

Building, Mathematics, Mechanics, general Sciences, History of Styles, Drawing and Designing, and Language.

How much of each of these is it necessary for a thoroughly-equipped architect to know? How much knowledge of each can be communicated in a school? Your programme calls for short papers, and I shall give you only an abstract of the longer document that I would have been glad to offer.

1. As to Building.—It is evidently impracticable, for want of time, to put the student through a course of practice in masonry, carpentry, and the like. We cannot train him in the manual of the shovel, the hod, and the hoe, nor oblige him to dress stone and lay it by line, level, and plumb, each piece on its natural bed and all properly bonded; we cannot make him an expert in the use of planes, saws, chisels, and such like. It would do him no special good if we could. It is not necessary that a man should be able to do certain work in order to gain a knowledge of it and be a judge of it, as all critics will maintain; nor will the ability to make a door be of any particular use in enabling a student to design a door. He can learn how a door is made by seeing somebody else make it, or from instruction in a class-room. By the use of his eyes and his ears he can learn all that he need know of the processes of building. Shop practice, in my judgment, is time thrown away, unless it be taken as physical exercise. The object of a course in architecture is not to make skilled mechanics. As to plumbing, steam-heating, electric lighting, &c., things which do not materially affect the planning of the building, nor in any way the character of the design, there are certain general principles of arrangement and operation that can be systematically taught, and a multiplicity of details that can be learned only by examination of apparatus and inspection of work in progress. Here, as in the case of masonry and carpentry, lectures and text-books are to be supplemented, illustrated, enforced, by visits to buildings in which the mechanics can be seen at their work. When once the student has learned how any particular kind of work ought to be done, he is capable of specifying it, and of deciding whether it is good, bad, or indifferent. The instruction in these subjects comes under the heads of Construction and Specifications, which should go together, and be begun early in the course. Fortunately, there are several excellent text-books on these subjects.

2. Mathematics and Mechanics may be spoken of together, as the required amount of the former will depend upon the use to be made of it in the latter. The Mechanics of Architecture, properly presented, is not an intricate or difficult subject. It is simply the statics of rigid bodies. Dynamics, phoronomics, kinematics, hydrostatics, may all be omitted. They are necessary to the engineer, but not to the architect. Under "Strength of Materials" the laws of tension, shearing, compression, and transverse strain must be explained; but they may be expressed in formulæ which involve no other mathematics than arithmetic and algebra, and the application of these to ties, struts, beams, and piers is very easy. For analytical investigation, however, geometry, trigonometry, analytical geometry, and the calculus, will be necessary. But if the student may be allowed to content himself with the results of other men's labours, if he does not care to rank as a man of science and find out how the results were obtained, he may very properly dispense with analytics and calculus.

As a matter of fact, when he gets into the practice of his profession, he will never use them. If he wants a rolled iron I beam to carry a given load, he will not proceed to design one with scientifically proportioned flanges and web. He will take a manufacturer's table and pick out one that will answer his purpose. The maker guarantees the strength of the beam; and the architect troubles himself no more about it. If he designed it according to the accepted formulæ, he would use a factor of safety, which one of our engineers has happily named "a factor of ignorance." It is best, of course, that a student should understand the theories of things, but it is not necessary. And furthermore, owing to the lack of homogeneousness in the materials we use, the factor in the formulæ which is derived from experiment on small pieces of comparatively perfect stuff, may be entirely unreliable in the case of large pieces. For example, we have recently learned, on our side of the water, that the average strength of wooden beams taken from the lumber-yards is very much less than the commonly-accepted formulæ would allow.

In the determination of the strains in beams and trusses, and of the line of pressure in piers and arches, the graphical method has, for practical purposes, superseded the analytical, and it is so simple that any one may use it and be made to understand the principles on which it is based.

3rd. As to general sciences.—Physics must, of course, be the beginning of any studies in science. The other necessary branches are Chemistry, Botany, Geology, and Mineralogy, the uses of which, in a course of Architecture, are too obvious to require explanation.

4th. History.—An architect, like any other professional man, ought to know what has been done by those who have preceded him. This knowledge he will get by the study of architecture in the historical order. The field is a vast one, and it takes a long time to traverse it thoroughly. But there are many books on the subject. Why not, then, let the student gain his knowledge by reading, rather than by instruction given in a school? Why is a teacher necessary?

My answer to these questions is that the book which will give full, correct, well-arranged information on the subject is yet to be written. The popular histories are usually either limited or superficial. Fergusson's, which contains a very valuable collection of examples, is imperfect, badly arranged, unsatisfactory in the treatment of important details, and padded with his theories and criticisms. What the student wants is a clear, complete, well-illustrated statement of architectural facts. Theories are interesting, but at this stage of his education they will do him little good. Criticisms will tend to bias his judgment, and prevent the free exercise of his taste when he is more mature. He wants to know what the Egyptians, and the Greeks, and the Romans, and all other people have built, when, why, and in what manner. He should make himself acquainted with the constructive devices employed, and their application to various classes of building. All is plain enough in the books generally so far as the Classical period is concerned; but when the student comes to Byzantine and Romanesque, he needs a guide, and a much better informed one than has yet written a book. The earlier authors will probably tell him that those styles are mere degraded Roman, and not worth his attention. The later ones will admit that they are interesting as phases of art, but that there is little to be learned from them,—at least, for any purposes of modern use. Mr. Fergusson, so far as he understands them, does them justice. But no writer seems yet to have discovered the fact that the time included between the years 400 and 1200 is the great period of architectural invention. We are taught to regard the Gothic architects as the most inventive. But what is there, among features that may be called constructive, which appears for the first time in Gothic? Really, scarcely anything but tracery. Buttresses, both common and flying, rib vaulting, pointed arches, compound piers,—all were in use long before there was any Gothic architecture.

As to the proper historica status and logical position of Romanesque, your Oxford professor of history, Dr. Freeman, has pointed out the fact that it, and not Roman, is the true representative of the arcuated system. Roman is really a transition from Greek to Romanesque; and I do not hesitate to say that I regard the Romanesque period as the one upon which the student should receive the most carefu

instruction. But when he looks into his books he finds them lacking in the very points that he wants to know about. The use of the compound vault in Roman architecture was limited to two or three forms.

The Romanesque builders employed many more. What were they? Is there to be found in any history any approximation to a complete statement of the varieties, their geometrical development, their geographical distribution? The Byzantine architects (Fergusson says the Roman, but neither he nor any one else has proved it) devised a pendentive for making the transition from the corner of a square to a quadrant of a circle so that a dome might be made to cover a square space. The Western architects modified this so that it might be carried on pointed arches. They also invented numerous other forms for getting from the corner to a straight line above, so that an octagonal vault might cover a square room, or an octagonal spire be placed on a square tower. Now, let the student turn to the histories and see what he can learn about pendentives. He will find that the information is very scanty. There are a few examples, but no one has gathered them together and classified them. Many forms are evidently unknown to the writers. Allow me to develop the forms of pendentives descriptively. It will not take long. The subject is almost entirely, as to form, a matter of geometry. Take first the preparation for an octagonal vault. A heavy stone slab may be laid across the corner if the scale of the building is not too large, and the job is done. Or a series of advancing corbel tables may be used on any scale. If the corners of the corbel courses be cut away to form a continuous plane surface, the pendentive may be regarded as an inverted triangular pyramid.

If the surface of this be curved on an arc of a circle vertically, a cylindrical surface is produced; if horizontally, a conical; if both ways, a spherical or spheroidal. There are also irregular forms, such as a transition from a cone to a half-dome. The same end may be attained by throwing arches across the corner, your familiar English squinch. To get to the quadrant of a circle a form is first employed whose surface is that of a sphere whose diameter is the diagonal of the square to be covered, or something more. This is adapted for being carried by walls or by segmental or semicircular arches. By means of it a dome may be used to cover a polygonal space of any number of sides. When a spherical pendentive is to be supported by pointed arches there is a geometrical difficulty. The surface, if accurate, would be composed of two spherical surfaces intersecting at an obtuse angle, and the line of intersection would have a reflex curvature at the top, as Sir Gilbert Scott has stated. But neither the angle nor the reflex curve has ever, so far as I am aware, been found. Sir Gilbert suggests, if I remember rightly, that it was obliterated by rule of thumb. In France, however, the problem was geometrically solved simply by taking the pendentive surface from a convex, conoid, or pointed dome instead of from a sphere. The above is an instance of what may be done by an instructor to aid a student in getting a clear, systematic, comprehensive knowledge of an important constructive device, which the books fail to explain.

The history of architecture should unquestionably be a leading feature in the instruction provided for in the course, and should be taught, in my judgment, not from any text-book, but by means of lectures carefully prepared so as to cover all necessary points and eliminate what is superfluous and irrelevant. These will be illustrated by photographs, drawings, lantern slides, and coloured prints, and for the detail of structural forms, which I regard as all-important, by models. Unfortunately such models are not to be found. The Five Orders, ornamental work in relief, and such like, are abundant; but models of domes, of vaulting (excepting the simpler forms), of pendentives, of the methods of making or covering the transition from the corner of a tower to the side of an octagonal spire, of corbelling from the side of an octagon to the corner of a square above, of the varieties of cusps, and of many other things, are not to be purchased. I have a collection of two hundred and more, most of which have been made by myself or under my direction. They are invaluable, as a model is usually worth any number of drawings for purposes of illustration.

5th.—Drawing and Designing.—Drawing, both instrumental and freehand, being the architect's means of expressing himself, should be taught with great care. Accuracy and clearness are the points to be insisted on. Every line in a drawing should mean something, and its meaning should be plain. Descriptive geometry, the science of drawing, is of the utmost importance, and the student must be thoroughly drilled in it, as he will have to apply it in stereotomy, in perspective, and in finding the limiting lines of shades and shadows. It is not necessary to make every student a fine draughtsman; but it is necessary that he should be able to draw with unfailing precision. Rapidity is desirable, but may be regarded as merely an accomplishment, though it has a commercial value. As to the higher art of painting in water colours, while the class ought to have some instruction in it, few will take to it readily, or become experts. I would include it in a course, but not always require it. There are many, who will became good architects, that will never learn to make a passably good coloured perspective. In fact, according to my observation, the best draughtsmen do not make the best designers. One who is intent upon expressing an idea will not stop to refine his means of expression.

As to designing, there are those who question whether it is possible to teach it. It is often considered as one of the things the power to excel in which is a special gift, the prerogative of genius. Doubtless there are men who will become good designers without training in a school; and there are some whom no amount of training will make skilful; but the average student can be taught the elements of the art in such a way as to develop his latent power. I have been astonished at the progress made by some of the bright young fellows under my charge.

As to languages, it is not practicable to require more than a year of French and a year of German, or two years of one. It would be better, I think, that the student should have Greek and Latin, which furnish most of the terminology of architecture, than any modern languages, but they are ruled out of the "new education" for scientific and practical ends. If taught in a Course in Architecture a considerable advance in them should be required as a condition of entrance. As to a choice between French and German, I incline decidedly to the former, if for no other reason than that it will enable the student to consult the best work on architecture ever written, Viollet-le-Duc's "Dictionnaire Raisonné." Until that is translated into our tongue, no English or American architect who aspires to any approximation to a full outfit for his profession can afford to dispense with the knowledge of French.

A few words in regard to the practical results of the efforts which our schools are making to teach architecture. Students who graduate from the four years' course are enabled at once to get employment. Their acquirements in drawing, designing, and mathematics make them particularly useful to their employers, and they commonly get rapid promotion. Whatever can be learned in an office they are peculiarly well qualified to profit by. Their habits of study lead them to investigate anything that on first presentation may not be quite clear. Their education has given them a power of absorption and assimilation by which they take in and digest knowledge from every available source. They soon learn the business methods of an office, and after two or three years of service may safely venture upon the practice of the profession.

Mr. E. C. Robins, F.S.A., next read the following paper

ON THE TECHNICAL EDUCATION OF STUDENTS OF ARCHITECTURE.

THE Examination of Architects has long been an established fact. Its first start was in the form of voluntary examination. The present Examination is compulsory for all who aspire to be associated with the Royal Institute of British Architects.

The Education of Architects is by no means an established fact, it is but an inference. It is taken for granted that architects are educated men, and that the Examination was all that was needed to show their title to the diploma, which it was contended was necessary to give to the public the confidence they required, and to the architect the distinction he deserved.

But if the Examination has served any good purpose, it has certainly been the means of opening our eyes to the necessity for more education, both general and technical.

The admirable circular letter of the President has appropriately followed the remarks contained in his opening address to the Institute, wherein he urged the importance of making articles of apprenticeship something more than a formal introduction to the profession.

And I congratulate the Institute upon the fact that the Amended Charter has removed the *non possumus* which stood in the way of beneficent action in the direction of architectural education.

The Royal Institute of British Architects is now empowered to appropriate any available funds for the furtherance of professional education, and can not only bestow the laurel wreath, but may nurture the growth of the candidates ambitious of its honours, without infringing its chartered rights. In these circumstances it has seemed to some of us a proper time to consider seriously in what way architectural education may best be promoted.

The fiftieth year of the reign of her Majesty will be celebrated in many ways, and by architects it will be remembered as the year upon which their chartered liberties were confirmed and enlarged,—may it also record the recognition of the necessity for extending architectural knowledge, and the establishment of an organisation by which young men intended for the architectural profession may be thoroughly fitted for the position in life they contemplate, in so far as a preliminary training may contribute to that end.

Entrance to the Church, the Army, the Law, and Medicine is guarded by special courses of instruction, through which candidates for admission must pass before presenting themselves for examination; and if any value is to be attached to the Institute examinations they must also be preceded by preparatory studies of a technical character. The nature of these studies is indicated by the pamphlet circulated by the Institute, but no special curriculum has yet been formulated.

The general spread of technical education among the masses is beginning to make itself felt, and if the pre-eminence of the architect in all building operations is to be maintained, he also must be technically educated; therefore, evidence of preparatory technical acquirements must be superadded.

Specialists of all kinds are rising up around us, and are perpetually narrowing the range of an architect's sphere of action. To maintain his position as chief constructor he must become the capable master and not the slave of specialists.

Some few years ago, at the request of the Council, I drew the attention of the Institute to the supplanting work of the specialists in sanitary construction, who were rapidly undermining the influence of the architect, by proving his incompetence to build a healthy residence. The result of that paper on "The Relation of Sanitary Science to Civil Architecture" has been to awaken architects out of their sleep in this particular, so that now it is as rare to find an architect neglecting the drainage and water supply of his buildings as it was common before.

Subsequently also, at the request of the Council, I have given to the Institute the results of my enquiries into the construction and fitting of applied science buildings, a subject to which my attention had been drawn through my early association with the Executive Committee of the City and Guilds of London Institute for the Advancement of Technical Education.

My travels at home and abroad in following out this subject have made me acquainted with the extraordinary advances now being made to raise the technical aptitude of modern students all over the world. Even at home, at the two extremes of the social scale, the elementary and workmen's trade schools and the Universities of Cambridge and Oxford are making ready for the applied science teaching demanded, and middle-class colleges are growing in number and completeness every day, whose curricula of education are exclusively technical. Professional men associated with the arts,—like engineers and architects,—can no longer be satisfied with purely academic knowledge in

an age of laboratory instruction in the applied sciences.

The Polytechnicum has never been an English institution, but its correlative, the Technical College, is every day growing in importance and influence, as it is seen and felt that the continued scientific and commercial supremacy of the nation depends upon its appreciation and extension.

The chance knowledge picked up by a pupil in an architect's office brought there straight from an ordinary middle-class school, innocent of either art or science, with everything to learn and nobody to teach him, is not the sort of person calculated to do honour to the Institute, though he may have just squeezed through and obtained a pass entitling him to become an Associate of the Institute.

The standard of the Institute Examination will certainly have to be raised in the near future, but it must be gradually done, and that in connexion with some well-organised scheme for imparting to architects the special knowledge they are admitted to require as professional men and practising architects seeking the Institute diploma.

We are all well aware that an architect must be an artist as well as a scientific man. It is his artistic abilities which distinguish him from the civil engineer. Nevertheless, if he too exclusively devotes himself to art in his early life, he will soon get a distaste for the scientific side of his profession. It is better that a youth intended for an architect should take courses in the sciences underlying his proposed occupation for a year or two before he goes as a pupil into an architect's office for three or five years, as the case may be, his cultivation of the fine arts being rather a relaxation from his severer and more exact studies. There is no fear of losing the artistic fervour, if it ever existed; nothing to hinder the use of the sketch-book at odd times and holidays, and, if he fails to do so, no better evidence could be given that his time would be better spent in finding out in what else his genius lies. There is a wide field of usefulness for an architect of good understanding and strong common sense, even if he be not artistic. And it does not fall to the lot of every architect to pick and choose the business he likes best.

As Mr. Conder wrote to me, just before he returned to Japan, "I am strongly for the more technical education of architects; in the present age, the antiquarian and 'exclusively artistic' side of the profession can only be of much value to a very select few, or to moneyed men who take up architecture as a pastime."

The object of this paper is tentative, not empirical; dogmatically to insist on any particular course of action is quite out of place in the present position of the subject. I simply propose to make a few practical suggestions, with the view of provoking discussion, and thus to lead to the careful consideration of the question and ultimate solution of the problem. To this end let us consider

1. The preparation of a syllabus of studies.
2. The organisation of a system for imparting a knowledge of the same.
3. The revision of the rules by which the Obligatory Examination shall be conducted on the completion of the foregoing arrangements.

Preparatory to addressing myself to each of these topics, it is necessary to have a pretty clear idea of what we want to do and how it is to be done.

1. Negatively speaking, we are not ambitious to increase the number of architects, but rather to improve the quality of future members of the Royal Institute of British Architects.

2. While we should welcome natural talent and self-taught powers wherever their merits entitle them to distinction, we are not thinking of lowering the tone and standing of an honourable profession, but are distinctly desirous of raising it, so that the titles "an architect and a gentleman" shall be convertible terms.

3. While we are not satisfied with the old system of apprenticeship, and think it is not now sufficient for the needs of the profession, we are not proposing to do away with apprenticeship, but, on the contrary, to render it more effective.

4. Without revolutionising the present system, we propose to build up gradually, but firmly, a more complete system, on the old lines, but in the new manner required by the circumstances and exigencies of the present environment.

Speaking affirmatively, I have already asserted that technical education is as necessary to the architectural student as to the artisan over whom he is destined to rule as a future practitioner. This point has been very clearly and tersely put by Professor Ayrton in the following paragraph:—

"Not only by means of technical education is the practical man trained to use his brain when he uses his hands, but what is quite as important for the country's welfare, *the scholar, by receiving technical education, learns to use his hands when using his brains.* Technical education, then, is not only the means by which scientific knowledge may be acquired by the manufacturing classes, but it also puts the scholar *en rapport* with the country's needs, and shows him what are the battles waiting to be won, with his all-powerful mathematical and scientific weapons."

The obvious result of technically educating the masses is this, that more exact knowledge of the applied sciences will be expected and required of architects throughout the land. Fortunately for us, the means of education are widening every day, and honest workers will not fail to take advantage of their privileges. For example, the City and Guilds of London Institute for the Advancement of Technical Education have founded three important metropolitan institutions:—1. The Kennington Applied Art Schools, in the South, where life classes for drawing and painting, modelling and sculpture, are carried on under many advantages. 2. The Finsbury Technical College and School of Applied Science and Art, in the East. The life classes and decoration courses are conducted by Mr. Brophy. Both these institutions are crowded with evening students, in addition to the day classes. 3. The Central Institution in Exhibition-road, South Kensington, which has no evening classes, but it is situated in the near neighbourhood of the Natural History Museum and the National Collection of Art Treasures.

The sciences of Mechanics, Physics, Chemistry, and Mathematics are already in full swing, and a chair of Architecture is in contemplation.

The professors of these institutions are ready and willing to second the efforts of the Royal Institute of British Architects by arranging special courses of study for architectural students should they ever be required. But it will first be necessary that the Royal Institute should know its own mind, and tabulate the educational provision it thinks desirable for would-be candidates for its honours; in short, we are thus brought face to face with my first proposition.

I.—The Preparation of a Syllabus of Studies. The first question which arises here is the length and duration of the classes. Shall we go in for day as well as evening classes? If the former, shall they embrace both science and art, and extend to a three or four years' course as in American and Continental technical colleges? Or shall we be content with one year's devotion to science, almost exclusively, before entering an architect's office as a pupil, and one day a week during the pupilage for the continuation of day studies in science and in art? (Of course, no earnest worker would fail to join evening classes and lectures, of which there is every variety.) I am inclined to think that the latter course would be all that could be attempted with success at the present stage of the movement, especially since we wish to retain the pupilage system.

Even so small a variation as this from prevailing custom would need an authoritative recommendation to be published by the Royal Institute of British Architects (similar to its papers regulating fees and competitions) addressed to parents and guardians, and the profession generally, informing them that in the opinion of the Royal Institute of British Architects the following is the legitimate mode by which entrance shall be made into the profession, after due notice and from a certain fixed date, viz.:—

"On the completion of the usual general education, youths intending to enter the profession of architecture shall have sufficiently prepared themselves to pass a preliminary examination, entitling them to the privilege of joining the first year's classes for science and art provided at the Central Institution or other accredited technical college in London or the provinces.

On the completion of this one year's course of three terms, the youths to be articled to an architect for three or five years as the circumstances of the case may dictate, during which time the architect is to allow his pupil to be absent for one day in each week, or fifty-two days in the year, for the purpose of attending day classes for continued instruction in literature, science, and art as a fine art. He is also to interest himself in the evening studies of his pupils, taking care that they are fully informed of the various classes available; the duty of the architect, as a rule, being confined to teaching the practice of the profession, unless he has a special aptitude for teaching generally.

One or more years after the completion of his articles the pupil may become a candidate for examination by the Board of Examiners of the Royal Institute of British Architects, upon the presentation of sufficient preparatory work and other credentials to satisfy the examiners that he is a fit and proper person to be examined. And if he passes creditably, he may become an Associate of the Royal Institute of British Architects, if elected in the usual manner. But no person shall present himself for examination who has not been a *bonâ fide* student of architecture, literary, scientific, and artistic, for at least five years."

Proceeding on some such lines as these, the syllabus of studies applicable for the first year prior to the introduction to an architect's office will have to be considered in the first instance. And it must not be supposed necessary or desirable to know only a little of everything in that first year, but rather to know thoroughly some few subjects, which, well grasped, will be of life-long value to the student.

The Journal of the Proceedings of the Institute (Nos. 8 and 9) contains full descriptions of three modern American technical colleges,—the Cornell University, at Ithaca, New York, described by Mr. W. H. White; the Columbia College, New York, and the Massachusetts Institute of Technology, both described by Mr. Arthur Hill.

They together represent an Americanised version of the Continental curriculum for the education of civil architects before passing a sufficient examination to entitle them to practise as architects.

And, like its foreign prototypes, this curriculum, when completed, in four years' time, takes the place of the usual term of apprenticeship; the student then entering an architect's office as an improver till he has picked up the business part of the profession with more or less readiness.

In these American institutions the course for architects in the first year is the same as that of other students, with the exception that architects and engineers are specially required to practise geometrical and freehand drawing. I propose to adopt a similar course, and by tabulating their first year's requirements the following is the resulting syllabus:—

Mathematics.—Geometry, plane and solid, descriptive and analytical, conic sections, trigonometry, mensuration, and algebra.

Art.—The history of the architecture of all ages and countries, freehand and linear drawing, projection and tinting, mechanical drawing, and the elements of perspective.

Physics.—Experimental mechanics, heat, optics, electricity, acoustics, laboratory practice in all.

Chemistry. — The chemistry of physics, materials, elementary chemistry, and laboratory practice; hygiene.

Language.—Either French or German, or both.

The above are together comprised in the first year's course of the American colleges, but they separately differ.

The value of this first year's course, which is necessarily an elementary one to be afterwards developed, is chiefly its preparative character,—its introduction to scientific accuracy and method, its alternate theoretical training and laboratory practice, its general sharpening of the wits and storing of the mind with scientific facts and formulæ.

The ordinary education of middle-class schools is presumably sufficient to enable a youth of seventeen to pass the preliminary examination entitling him to pursue the above studies at an applied science college.

During the period of his articles, the student will make use of his evenings and of the fifty-two days in the year which his master will allow him to be absent from the office to acquire the further information which is given at the American colleges during the last three of the four years' course.

Both the Cornell University and the Massachusetts Institute provide a special course of Architecture, extending over two years only, and it may be sufficient to tabulate the subjects included therein as a guide to what is expected to be done during pupilage in addition to the continuation of the first year's applied science course already given in the syllabus for the year prior to entering an office, thus:—

Primarily.—Architectural history generally; Egyptian, Greek, and Roman architecture;

Romanesque architecture; Gothic architecture; building materials and construction; mechanics and graphical statics; mechanical and free-hand drawing; projections, shades, shadows, and perspective; sketching and water-colouring; and principles of design.

Secondarily. — Renaissance architecture; modern architecture; ornament and decoration; construction and planning; working drawings and framing; specifications and contracts; original designing and drawing; schools, churches, and theatres, &c.; ventilation and heating; surveying and geology and mechanics; and acoustics, chemistry, and mathematics.

More or less acquaintanceship with the subjects enumerated in addition to the professional practice acquired in the routine of a general practitioner should enable a young man to pass a highly creditable examination entitling him to the Ashpitel prize.

II. — I have now arrived at the second division, viz., the organisation of a system for imparting a knowledge of the subjects contained in the foregoing curriculum.

I am of opinion that the first year's course can only be efficiently taught at one or other of the technical schools or colleges, metropolitan or provincial, and I have satisfied myself that as soon as the demand is created so soon will the supply arise. I have found that the disposition of professors generally is to strive to meet the expectations of the public and to organise courses of education suitable to forthcoming students. At all events, I can answer for the professors attached to the metropolitan technical colleges.

As to the day courses for pupils in offices, here again the want will create its means of satisfaction. And it is not altogether visionary to suppose that the Institute itself might organise a system of teachers and lecturers for architects' pupils.

As regards the evening classes, no difficulty at all can arise. Besides the courses at the Academy, the University and King's Colleges, and technical schools and colleges, there are the Architectural Association and other federated societies; in short, it will not be want of means but want of will and energy to use them that will be lacking wherever failure occurs. Therefore I may at once proceed to the third and last division of my subject, viz.,—

III.—The Revision of the Rules by which the Obligatory Examination shall be conducted.

Probably this last head is one which may be more appropriately discussed at the Board of Examiners than at the present gathering, and all I care to say upon it is this,—that the proportion of marks which shall be sufficient to entitle a student to pass must always be regulated by the means of education provided to enable him to reach the required standard. That standard also must be adjustable to the general growth of intelligence, until the organisation is complete; not only for examinations, but for teaching the knowledge required to creditably pass them, very little variation upon our present system would be possible.

But too much stress cannot be laid upon the great importance of starting fair with a year's scientific training before entering the office of an architect, to be followed up thereafter by day and evening classes, as artistic as may be.

Enthusiasm for work and for art will take away the drudgery. Armstead, the great sculptor, supported himself by designing silversmiths' work for fourteen years before he took to sculpture as a profession. He worked from nine to five for his livelihood, attended life classes from seven to nine, and then went to play at home work, and study till twelve or one, and this he kept up for several years. Verily, genius is but another name for enthusiastic work and study.

Mr. Arthur Hill, B.E., of Cork, next read the following paper:—

COLLEGE TRAINING FOR ARCHITECTS.

In all professions special training of some kind is an acknowledged necessity. The old-fashioned system of apprenticeship, whatever advantages it possessed, is now as much out of date for professions as it is for trades.

If any one desired to make his son a doctor, would he bind him apprentice to the old family physician; to trace prescriptions; to read such medical books as might come in his way indiscriminately; and occasionally, perhaps, to have the benefit of a little carriage exercise in his master's brougham? Would this process be likely to produce the highly-trained body of scientific men, who, as physicians and surgeons, are now to be found in every corner of the kingdom? Would he not rather send his son to some recognised school of medicine, where he would learn the theory of his profession before coming in contact with its practice from men who had already made a study of the art of teaching, and where every aid to learning that could be devised was at the student's command? It is the same with many other professions. The public know very well that preliminary college training for them is simply essential, and institutions are to be found everywhere ready to take a student and teach him exactly what he needs. With architecture it is quite different. People fancy that the routine of an office and the payment of a fee will supply all the education that is needed from the time a boy leaves school until he is expected to be able to swim for himself. And even if any one thinks otherwise, where will he find the professional training he requires? Outside London it is not to be had anywhere in a complete form, and even in London itself teaching must be sought for in three or four different places, wholly unconnected and without system. In any case, the student is left pretty much to direct the course of his own studies according to his own fancy.

There is no reason why architecture should not stand on the same platform as Medicine and other professions, and be included in the curriculum of the several universities of the kingdom, one direct effect of which would be the status it would give Architecture as a learned profession,—a status the public would not be slow to acknowledge. Arrangements could easily be made, at least in those colleges where schools of engineering already exist, which would enable young architects and young engineers to pursue their studies side by side,—an association which would be of manifest benefit to both.

The problem has been already solved in America. In several colleges in that country Departments of Architecture are to be found. In Columbia College, New York, which I may take as an example, there are seven parallel courses, all leading to a degree, viz., 1, Mining; 2, Civil Engineering; 3, Metallurgy; 4, Geology; 5, Chemistry; 6, Architecture; 7, Sanitary Engineering. The first year's course, which is the same for the students of all the different departments, embraces mathematics, some of the physical sciences, and drawing. The second year's begins to take a special professional direction, introducing the history of architecture into a course which is mainly an extension of the former. In the third year, the higher mechanics, strength of materials, and other scientific studies are linked with architectural design, decoration, and drawing; while in the fourth year the student's time is more devoted to art and professional work, and science is only treated in its application to technical subjects.

In England we are quite as well able to provide a system of professional college training as they are in America; and the facility we enjoy of being able to study ancient monuments without crossing the Atlantic Ocean is at least one important point in our favour.

In Liverpool, a most admirable School of Civil and Mechanical Engineering has recently been established. There is a similar school in Bristol. Owens College, Manchester, is well known; and in other towns besides London technical schools are springing up, mostly due to private munificence, such as the Mason Institute, where scientific training is to be had, but where,—unfortunately for scientific men, as well as for others,—science is taught without the smallest shade of art in the prevailing atmosphere.

Now every one of these Institutions, as well as the Irish and Scotch Universities, could be utilised for the purpose, and Cambridge, with its magnificent School of Archæology and its Slade Professorship, and the recently-established School of Applied Mechanics, might also aid in the movement.

At Bristol an effort has already been made to associate architecture with engineering in one department. How far it has been successful I am unable to say, but an isolated and tentative effort of this kind, without general professional connexion, cannot hope to effect the tithe of what a united effort would, with the assistance of the profession at large.

At the Conference of 1874 a paper of mine was read advocating the addition of a Professorship of Architecture to those colleges where a school of engineering already existed. In repeating the suggestion as I do now, after an interval of thirteen years, I believe the necessity of some system of education for architects is no longer in question; that nothing remains but to devise the way and the means. Since then the Royal Institute of British Architects' Examination has come into existence, and any system of education that may now be devised should be so built up that this examination may become the key-stone of the whole.

Now examinations conducted without a properly connected underlying system of tuition cannot be productive of any uniformity of result, a defect fatal to any broad influence of general benefit to the profession. But with a system of collegiate training, not confined to the metropolis, but scattered in many parts of the kingdom, all working in harmony, preparing candidates for this Examination, a very different result would be attained, for there can be no doubt young men who had spent two or three years in some college where their time was wholly devoted to study, and not frittered away in the commonplace duties of a drawing clerk, would ineffably surpass those whose reading was of the present promiscuous type, thereby tending (1) to raise the standard of the examinations and consequently of the profession at large; (2) to impress the public with the advantage of proper preliminary training.

Theoretical college work is not intended as a substitute for pupilage in an architect's office, but as a preliminary step thereto, for business habits cannot be acquired by theory, and the various details of practical work must be learned by contact with them. But an architect, once accustomed to pupils or assistants who had a knowledge of drawing, of the nature and properties of materials, and some idea of mouldings and other architectural details before entering his office, would never again take a raw youngster, no matter what fee was offered, but would recommend the youth to study in some college for a couple of years or so, and then, and not until then, to think of office-work.

Of course, any scheme of education would be doomed to failure unless it were taken up by the profession at large with the intention of making it an ultimate success; and it is upon this particular aspect of the education question that the Conference may be so influential.

It is not necessary to refer in detail to the subjects to be taught; the extent or balance of the various studies; how they should be taught; and who should teach them; as these matters do not affect the main question, and are comparatively easy to arrange; but examinations, the award of diplomas, and the general control and direction of the system are questions of primary importance and demand more particular reference.

Each of the several colleges already referred to might set up independent schools of architecture, and grant any degrees or diplomas they chose, having no connexion with the Institute or profession in any way,—a state of things undesirable, but not at all unlikely to arise unless the profession take an initial step and appoint a General Board of Professional Education, whose duty it should be to organise, control, and direct everything connected with education throughout the whole country. This Board should consist, in the first instance, of those gentlemen who form the present Examination Committee of the Institute, who have devoted so much time and labour to this matter, and who have brought it into the position it now occupies, together with representatives of the Architectural Association, and possibly of the leading provincial societies also. Some of the professors of the different colleges which, from time to time, join the scheme, should, *ex officio*, have seats on the Board, or, at least, a consultative voice in the settlement of technical questions. But the Board should act as the representative of the Institute, and be responsible to that body.

Their first duty should be to enter into negotiations with some college or colleges to be selected for the purpose of experiment,—say, for example, King's or University College, London, and in the provinces, Liverpool, or Owens College, Manchester,—and secure the

appointment of a professor, or professors, of architecture, who would lecture on professional subjects, and superintend the drawing school and class of design. Then a proper course of study should be arranged. In these colleges many of the courses on scientific subjects and languages would be found exactly suitable for the purpose without requiring any alteration, and the special lectures now intended for engineers might be utilised to a large extent, so that in this way a very comprehensive education might be afforded to the future members of our profession, without any expense save that of the special architectural course, and the cost of this, together with any illustrations or books that it may be necessary to provide could not under any circumstances be very serious, and might be divided in some ratio between the Institute and the colleges themselves.

From year to year further efforts should be made to induce other colleges to join and become affiliated to the Board of Education, so that ultimately all parts of the kingdom may be included in the system.

Having so far provided for "education," the next duty of the Board would be that of "examination." To insure uniformity of teaching amongst the different colleges, all examinations should be conducted by examiners appointed by the Board. The examiners might visit and hold examinations in the different centres, or all the candidates might assemble in London for the purpose. The final examination for the degree or diploma which, under the new Charter, the Institute have taken powers to confer, might be found preferable to conduct in this latter way.

A student should give his whole time to study for the first two years, but the third year's course might be so arranged, by giving the lectures in the afternoon or evening, that the student could commence practical work in an architect's office at the same time if he were disposed to do so.

The examinations should be divided in the same way. One to be held at the end of the second year's course, equivalent to what is called the "half degree" in some universities, and carrying with it admission to the Institute as an Associate. And after the third year's course, a still higher examination for the Diploma in Architecture and Fellowship of the Institute.

Of course, the scheme is here indicated in general outline only, and yet requires a great deal of consideration before all the details can be filled in, but I believe it is quite capable of being brought to a successful issue. Its main features are:—

1. Decentralisation.
2. Education conducted by trained teachers.
3. Professional control.
4. Maximum of result combined with the minimum of expense.
5. The association from the beginning, of art and science in the same course of technical education.

The adoption of some such scheme as this, which can be effected without an Act of Parliament, will tend more than anything else to produce the federation so many seem now to desire, but in what I believe to be its true form, namely, the federation of learning.

Professor Aitchison, A.R.A., then followed with a paper

ON ARCHITECTURAL EDUCATION.

GENTLEMEN,—It seemed to me that a conference where there was no conferring was a waste of time; that when we were visited by able men, practising in the large manufacuring, mercantile, and agricultural centres, or coming from the North,—one of the main sources of the sap and vigour of our nation,—it would be culpable negligence on our part if all these means of mutual knowledge and improvement were to come and go in vain. Diamonds can only be cut by other diamonds.

The burning questions of the day, architecturally speaking, are, in my opinion, these:—

1. How can the public be made to desire architecture and to appreciate its excellence?
2. How can architects be adequately rewarded for their skill and knowledge; for, under the present system, they are obliged to present all their artistic work for nothing?
3. What can be done to aid the progress of architecture?

This third question has for one of its factors, at least, the education of students, and it is to this particular factor that I propose devoting the few minutes that are allowed me.

In his "Essay on Studies" Bacon says:—"Read not to contradict and confute, nor to believe and take for granted, nor to find talk and discourse, but to weigh and consider." I have, therefore, tried to weigh and consider this subject, and to put the results before you as well as I can, even in spite of being dull, bearing also in mind another of his precepts, that "some in their discourse desire rather commendation of wit, in being able to hold all arguments, than of judgment in discerning what is true, *as if it were a praise to know what might be said and not what should be thought*," and I hope that those present may throw more light on the subject, fill up omissions, and correct errors.

The subject seems to me of paramount importance, for it deals with the future excellence of our art; and I feel certain that there is not one architect or architectural student amongst us who would not sacrifice himself if he felt sure that by so doing he would insure a more brilliant future for the art he has embraced.

I think we may be proud of what has already been done in our time by architects, but that is no reason for not striving to do better. We have lately been overhauling the weapons in our own conquering army, not without advantage, and doubtless there are points in its drill, discipline, equipment, and skill that are capable of improvement.

The first thing that strikes us is that when an art is native, and when it is the expression of a popular want, we find no schools of it. I may instance, in the arts of the day, novel writing and engineering. Schools are mostly founded for one of two reasons,—either to start an art that does not exist, or to prop up one on the verge of decay.

We could form, too, a better notion of the value of schools, if we found that where there has been the best school there has been the best architecture; but it is not easy to know which country had the best school, unless we take it for granted from its having the best architecture.

I think if the civilised world were polled at the present day each nation would place French architecture in the second place, *i.e.*, after their own, and France has in the École des Beaux-Arts an excellent central school, though some of its former pupils think that French architecture is good rather from the natural gifts of the nation than from the teaching of its school.

We have only one good architectural school in England, the Architectural Association, and that is rather a mutual improvement society than a school.

It is very curious we should know so little about the schools of past times. What were the Greek and Roman schools like? We do know, however, that the Roman Emperors founded schools in Gaul, but these, I imagine, were what we should call grammar schools. I believe the technical schools were the Roman trade guilds. We know, too, that Charlemagne established schools in his empire, and that some of the professors were got through Haroun Alraschid from the Saracens. We know that the Saracens established schools in connexion with their great mosques, and devoted themselves to studying the geometry of the Greeks, and that at the beginning of the ninth century, viz., 813-834, in the time of Mamoun, Haroun Alraschid's son, algebra was introduced to the West from Mohamed Ben Musa's Arabic translation of the Hindoo algebra.

The first start of Saracenic architecture was in A.D. 885, and by a Christian architect; and Gothic began towards the end of the twelfth century. Although this may seem a little beside the point, particularly as we know so little about it, it is dropped as a suggestion of the effect produced, by the study of mathematics, on the new styles of architecture of those times.

The Benedictines we know had workshops for glaziers, jewellers, and goldsmiths attached to their monasteries, and must also have had architectural schools as well, for as early as 1009 A.D. they furnished the main dimensions of the monasteries to be erected in distant parts.

Nearly all our great poets have been to one of the Universities, though we must except Shakspeare and Burns.

Of the great seventeenth-century architects, neither Wren nor Perrault was educated for an architect, and it is doubtful if Vanbrugh was.

It seems to me that as we cannot produce men with great intellects and with a taste for architecture, our only plan is to look at what is wanted, and to render the acquisition of the necessary knowledge as easy as possible, and, above all things, to bear in mind that though we cannot produce a genius we may well spoil one by smothering his talent under a mass of knowledge. As Mark Pattison says, "Accumulated learning stifles the mental powers."

It is comparatively easy to state what a man should know to be an architect,—at any rate, if you exclude the fine art,—but we have to consider what chance there is of his being able to learn it; for, to be a great architect requires a combination of qualities very rarely found to exist in the same person. Great architects are not "like two single gentlemen rolled into one," but, as was lately said, like eight or ten.

I think we ought to be careful that our student is not equipped like the knight with a mousetrap and a beehive, lest he should sleep at a place overrun with mice or meet a swarm of bees in his travels.

It seems to me that every architect must be able to construct soundly, for without that he is no architect at all. It is a great advantage to him if he knows mathematics, and when I say know, I mean that he can use the higher branches, or else he must take theory on trust, ard be indebted to some one else for the solution of difficult problems. But he must know arithmetic. He ought to know descriptive geometry for developments, the interpenetration of curved surfaces, for the setting out of staircases, and of groins, vaults, and domes, with their ribs or panellings. With the Greeks, the Saracens, and the Mediævals, geometry was the foundation for architecture.

We know from the "Arabian Nights" that the Saracen architects are always called mathematicians or geometers, even if we had never seen their elaborate geometrical patterns; we also know what a deep knowledge of practical geometry the Mediævals must have had, from their works. To revert to our student, he must know the statical problems that are met with in building, or he must have great observation, and great memory, and then, too, he will probably only feel safe, when he is within the limits of works already executed. He must, too, have a thoroughly practical acquaintance with the materials he uses, if he is to escape serious failure, and as few architects have any real practical knowledge, he must have it theoretically.

He must, too, be a master of geometrical drawing.

He must more or less be able to plan.

He must have a fair notion of how his rooms are to be lit, warmed, and ventilated, and of those requirements for health, in the shape of drainage, &c., and precautions against heat, cold, and damp.

He wants some small knowledge of the law of contracts, and of the laws of easements, &c.

The fine art part stands in a very different position.

It is a thousand to one against any student having any architectural invention, and, as far as I know, invention cannot be taught, though there is now a proverbial belief that a good school is like that American machine where, if live pigs go in at one end, pickled pork, saddles, and hair brushes must be turned out at the other.

We have therefore not only to provide the proper instruction for the one born architect, but we have to furnish the others with something, that will more or less take the place of natural powers and invention.

I will put a case which, I think, will make my proposition clearer. Suppose we want to make musical composers out of a-thousand-and-one young fellows, and, as our first test, we take only those who can whistle a tune or play "Jim Crow" on the Jew's-harp, what provision should we make for their teaching?

I have used this illustration because it strikes architects that musical composition is a rare gift, while it is commonly supposed that architectural composition is a common gift, although it is not more common than the other.

The utmost we can do is to cut, polish, and set the stones we have picked up on the beach, the bulk will be flints and Brighton emeralds. We are lucky if we get a few agates, some rock crystals, and a few common amethysts amongst them, and we can hardly expect to find a ruby, an emerald, a sapphire, or a diamond.

Let us see what we can do in the way of cutting, polishing, and setting.

You cannot have architecture without proportion, and scarcely without mouldings.

The ordinary method of teaching harmonic proportion is to let the student draw out the Greek orders, and a few Greek buildings, and learn the ratios, and perhaps to draw one, and calculate the ratio of a few other buildings celebrated for their proportions, and try by these means to cultivate his taste.

We do the same with the Greek mouldings, but too frequently forget to teach him that these were executed in marble for a clear atmosphere and a sunny climate, while our material is brick or stone, our climate is misty, not to speak of the fog in large towns, and the climate is the reverse of sunny.

Gothic mouldings will at least show him how to get shade in a sunless clime, and also the devices used to produce lines of light, and he should be made to design mouldings for various positions, as elegant as Greek ones, and as logical for our climate as the Gothic ones.

Study will give him more or less insight into the harmonies of lines and shapes.

Style we cannot teach, for no style peculiar to our time exists in any civilised nation of the world.

Our only hope is that, by showing him the real styles that have existed, Greek, Byzantine, Saracenic, and Gothic, and by letting him take an artless structure built in accordance with purely logical deduction, he will try to make it beautiful.

Eccentric ugliness is better than second-hand beauty, if it be the right step forward.

Viollet-le-Duc's humorous comparison of architects to an opera chorus where they all sing "Let us go," and never move, is as true now as it was when he wrote it.

Queen Elizabeth's stinging repartee to Raleigh seems to be acted on by all architects in a contrary sense:—

Raleigh.—I fear to climb so high lest I do fall.
Queen Elizabeth.—If thy heart fail thee, do not climb at all.

If an architect has time and talent enough to be a sculptor as well, by all means let him be one, but our buildings are covered with such vile ornament because the architect thinks he ought to design it and have it carved by a mason. The public encourage this; they care nothing for sculpture, and know if it is architect's work they get it for nothing or next to nothing.

If Fergusson was right in his statement that the only cause for our not being superior to all past times in the fine arts is because we go the wrong way to work, it would be of the very first importance to find out how the Greeks, the Byzantine-Romans, Saracens, and Mediævals were taught and worked; but I fear the causes lie deeper than that. Nevertheless, much improvement is lost by isolated work, and more by not making a second building in correction of the first. All that we know is how the Italian Renaissance architects were taught. The Italians first apprenticed a youth with a taste for the arts to a goldsmith to make him handy with his fingers, and to assure him of a livelihood should he fail in the arts, they taught him to draw the figure, and if he wanted to be an architect, he picked up architecture by measuring ruins, and seeing how new buildings were built.

Though "self-taught is well taught," real systematic instruction is, in my opinion, invaluable; it not only saves time, but it is more thorough and complete; only the teaching must not be by pedants, however learned or able, but by men who know that their teaching is towards another end, and who will render it as useful as possible to that end.

Professor Ayrton, in a lecture given at the house of one of our professional brothers, put this very well:—

"Let us make a student understand that a certain knowledge is of real service to him, and he will then,—unless he is exceptionally lazy,—exert himself to gain what he feels the need of. This most important element in human nature, the desire to get what we want, seems to me to have been sadly overlooked in the educational system of the past."

From a lack of preliminary knowledge pupils seem to me to leave an office at the very time the knowledge they can *only* get there, is beginning to be of use to them.

The three main things nineteenth-century architecture seems to me to lack is more original and daring construction more invention, more perfect subordination of parts, and greater finish.

If you agree with me, it is for you to say how we are to compass this.

Professor T. Roger Smith next read the paper immediately following,—

A STUDIO FOR ARCHITECTURE: A SUGGESTION.

No proposal for architectural education is, in the judgment of most of us,—certainly in mine,—likely to supersede pupilage as the most valuable way of fitting a youth for the practice of architecture. But something is needed that shall supplement pupilage.

I have a recollection of a most influential public meeting held under this roof, now many years ago, which appointed a committee and set on foot an organisation for architectural education on a somewhat grand scale, with such men as Ruskin, Scott, and Burges upon it; and the effort led to no result. My suggestion to-day is, that the attempt should be made in quite a different manner, with a comparatively modest and unpretending equipment, and under the sole guidance of one or two suitable men who can give time and attention to it, and, I believe, that a modest commencement of that sort might have a better chance.

What appears to me desirable is an organisation for giving regular systematic instruction day by day, at the drawing-board chiefly, and therefore different from and in addition to the classes at King's College or University College or the Architectural Association.

Instruction in architecture obtainable in the day-time at moderate, yet fairly remunerative fees, in the metropolis, and the great centres, such as Edinburgh, Glasgow, Manchester, and Liverpool, ought to attract students of at least three distinct classes. (1.) Youths destined for the architectural profession who have left school or college, but whose friends are very wisely advised that they will be better prepared to reap benefit from being architects' pupils if they have some instruction in the rudiments of architecture before being articled. It is, let me observe in passing, of great importance to provide for youths at this stage something which shall form a kind of bridge between the regular routine of school, when all the work is cut out before hand, and every hour accounted for, and the freedom from restraint, and usually also from guidance, of an office. (2.) Pupils whose masters recognise that their offices are not places where much definite instruction is possible, and embrace an opportunity of securing such teaching outside. (3.) Young men of older standing preparing to pass the Institute Examinations. Classes 1 and 2 would furnish the junior students; class 3, the seniors, some of whom would be fitted to act as monitors, with advantage to themselves and to the juniors, as some of the elder men did in Mr. Harvey's excellent masonry class.

The object of this paper is to suggest that it would be perfectly feasible, and not difficult to establish for the benefit of such students, by private enterprise, what I propose to call an architect's studio; not on the lines of the *ateliers* in which architects, painters, and sculptors in Paris learn their art, but with some resemblance thereto, though more like some private drawing studios, such as Lee's, which have done good work in London at one time. I believe that such an establishment set up by the right man, would be successful, and would be of great service.

Why should not a properly-qualified architect,—or better, two friends, of whom one inclines to the art and the other to the science of our profession,—open a large well-lighted room, fitted like a drawing-office, but with the addition of a good supply of the needful books, prints, and plaster casts, where students could attend five days and a half in the week, and receive instruction, and draw, under constant, or at least daily, guidance and supervision?

The subjects to be taught ought to be those which the master is thoroughly competent to teach, and such as the students most require to learn. Some or all of the following suggest themselves:—

1. First, draughtsmanship.—Every drawing made should be scrutinised from the point of view of how it is done, as well as what it represents, and each day's work, as far as it is done with the pencil, should be a drawing lesson as well as an architectural lesson.

2. Architectural forms and details.—In the case of junior students I would limit this to a somewhat complete study of Greek from prints and drawings, and, where possible, casts; and of some one period of English Gothic from actual buildings and plaster casts. Perhaps I may be permitted, as it is necessary to make this paper short, to refer to my syllabus on the study of architecture issued by the Department of Science and Art, for a statement of the reasons for this programme, for which there is not space here. In the case of advanced students I would add work in that style of architecture with which the teacher has made himself most familiar, or in which he has won distinction, and if this were to lead to the formation round an able teacher of something like a school I do not think the result would be a bad one.

3. Designing architecture, general principles of composition, consistency in the use of examples, and practice in making designs to conform to a fixed programme, and to embody the forms and details of a definite style.

4. Perspective and sciography.

5. Water-colour drawing.

6. Measuring, sketching, and drawing out portions of some existing building, and drawing up a written description of the same.

7. Descriptive geometry, and the modern graphic methods of investigating the strains in trusses, beams, arches, and other structures.

8. Building construction.

If it were possible to combine with the studio a workshop where the students could do some carpenter's, joiner's, or mason's work, under a competent foreman, this would add to the value of the course.

Students who attend a studio could consult the master about their private reading and how best to employ their evenings, and which of the various institutions or classes open affords them the instruction suited to their individual needs. I do not think the studio should itself have evening classes, unless it were drawing-classes. Some of the students might, perhaps, spend part of the day-time as well as their evenings in attending classes for the study of some cognate subject, such as mathematics, geology, mineralogy, or hygiene.

The experiment would have the best chance of success if tried first in London, or better still Westminster, close to the Abbey and the Architectural Museum, and within easy reach of the South Kensington Museum, and accessible from most parts.

The most difficult and most essential part remains, viz., to find the right man for the undertaking, and to deter the wrong one from attempting it. He who might with advantage start and carry on such a studio must be an educated and cultivated person, both as to general knowledge and as to architecture. If he is to teach and train he must first know and be trained. He must also be apt to teach. This aptitude is to some extent a natural gift.

Further, he must be thoroughly in touch with the students. This is perhaps oftenest met with in a young or youngish man, but mature age need not be a disqualification. There are many men past middle life still capable of feeling all a young man's difficulties, winning his confidence, and rousing his enthusiasm. Who, for example, that knows our friend the present Director of the British School of Archæology at Athens could imagine that his years and his honours would ever prevent any student from feeling at home under his guidance?

A last qualification, but I think an essential one if the experiment is to succeed, is that the master must be to some little extent a man of mark. I do not mean that he must be a Royal Academician or some one of that standing, but he must be sufficiently a marked man to command the confidence of students, of the body of architects, and to a certain extent of the outside public; otherwise students will be slow to find him and their friends backward in sending them. He must also be able to devote a considerable amount of time to the work; not, indeed, all day, but some part of every day, and with energy and devotedness it appears practically certain that the starter of such a studio would render a great service to his profession, and that his undertaking would serve to introduce a much-needed improvement.

Mr. R. Phené Spiers, F.S.A., read the next paper, on

THE ARCHITECTURAL SCHOOL OF THE ROYAL ACADEMY.

As it is now close upon eighteen years since I was appointed Master of the Architectural School of the Royal Academy, it has seemed to me, on the present occasion, that a few words might not be out of place on the experience which I have there gained in the training of students in architectural design and draughtsmanship.

It may further be of advantage if in the discussion which may follow, some hints are given as to any development in the programme there carried out.

I feel strongly, in these days of progress in education, that it is impossible to stand still, and although the advance in architectural design which has taken place in England during the last fifteen years is greater than the most sanguine of us could have hoped, that very progress should give us hope, and incite us to further endeavours in the promotion of greater development.

As it is always necessary to commence on some foundation, when appointed by the Council of the Royal Academy, I began by an attempt to carry out those principles in which I had myself been brought up, viz., the curriculum of the École des Beaux Arts in Paris. I soon found out two difficulties.

1. The time at the disposal of the students was too short to allow me to hope that I could give them more than a smattering of French traditional teaching; and

2. In many cases I had to deal with students whose taste and predilection were in favour of almost every known period of art, and the utmost I could do was to accept their version of what was the correct style to design in, and to confine my advice within the limits of the styles they selected.

In 1876 or 1877, the late Mr. George Edmund Street proposed to the Council of the Royal Academy that the Architect Members of the Academy should be allowed to contribute their quota of instruction in the school, as had always been done by the painters and sculptors. At first, I did not think the scheme was likely to succeed, for it seemed difficult to understand how architects in large practice, and who were obliged to be frequently absent from town, could attend regularly. I was mistaken; the Visitors (as they are called) made it an engagement, and from then till now have carried out completely the programme which Mr. Street laid down.

It is needless to say that it has been productive of the greatest good; after many years of teaching there is a natural tendency to settle in a groove: it was not observable at the time, but now, as I look back on the old days when I was Sole Director, I see I was running in a groove out of which I have been taken by the Visitors, and I have probably learned more from their teaching than perhaps even the students.

The Visitors are, of course, men of different views, but they have all of them recognised that they had to deal with students designing in various phases of style, and have given their advice accordingly. I remember when Mr. Street first came down he began by presenting each student with a design of his own. He found, however, that when they came to a second subject they expected another design, gratis, to be made for them, and he saw that it was better to take the students' idea, and suggest how it could be improved. It was interesting to note how, with his profound knowledge of the value of mouldings, a poor, commonplace cardboard design developed itself gradually into a fair example of serious work, reasonable in its plan and in its construction, and in some cases of great artistic merit. It is on this principle that the instruction in the Academy is given, and I consider that if the student is required to frame his plan on the actual requirements and their best distribution, to base his elevation and section on the plan, and to keep the whole design within the limits of sound construction, it is better to leave alone the question of style for the moment to the taste of the student, and to trust that in course of time artistic design will naturally develop itself. If, for instance, a student brings down a design bristling with Dutch impurities (and I am afraid Mr. Norman Shaw has passed many a *mauvais quart d'heure* over some), it is of no use trying to make it pure Italian. Keep within the style (if it can be called one), but insist upon the construction being properly shown, and the scale being preserved throughout, trusting that in course of time the impurities will pass away: everything must have a beginning. I do not mean to say that this is always done. Owing to office and other engagements, there is not that regularity of attendance which enables the Visitors or myself to see our advice carried out to the full, but it is the principle on which the instruction is based, and I am sure of this, that, so far as construction is concerned, there is rarely a drawing sent in by an Academy student which would not make a much better *working drawing* than the finest example sent up in competition in the École des Beaux Arts. The English architectural student has fortunately never even heard of that pale pink tint which is generally passed over all the sectional parts of French drawings, even in those which are sent to the contractor as working drawings. Now in making these observations, it must not be supposed that I wish in any way to diminish the immense value of an academical course of training, such as is given in the École des Beaux Arts at Paris; having passed through it myself, I should be most ungrateful if I did. But we have to take things as they are. There is no National School of Architecture here; there is no traditional teaching of 200 years, as in France; so far as architectural design is concerned, I am inclined to think this is a positive advantage, and that in consequence English architecture is at present in a much more healthy state than that of either Frence or Germany. In Ecclesiastical architecture it has always been so, and of late the progress made in domestic and town architecture has been such as to outstrip entirely our foreign contemporaries. In speaking of town architecture I am referring to single buildings only, and not the arrangements of streets and squares, in which, unfortunately, the advice of architects is entirely ignored. There are various causes to which I attribute this, and if I venture now to express my opinion on them it is (1) to challenge criticism, and (2), if I am right, to emphasise their existence, so as to guide students in their future studies.

Firstly, to the influence of the Gothic revival we owe the foundation of our modern school. The practice of constant measurement and delineation of our ancient cathedrals and churches for the purpose of their restoration led of necessity to the study of the principles on which their designs were based, and English architects, instead of trusting to pattern-books for their ideas, went to nature; that is to say, having no traditional school of teaching, they sought for the principles of design in ancient work. It was a much longer process, and the full measure of its value was becoming apparent about fifteen years ago when, singular to say, one of those peculiar changes of taste took place to which, in the absence of traditional workmanship, we are liable, and the later phase of the Renaissance styles gradually forced themselves to the front; but the seeds were already sown, and the interpretation of a phase of style (say, for example, of the architecture of Francis I.) by an English architect approaches much nearer to the spirit of its design than that which can be conceived by a student who has followed the traditional teaching of a foreign Classic school.

Secondly, we have to take into account the more practical mind of an English student, who bases his design on the nature of the materials he has to employ, and who, in default of abundance of stone and to waste, as in France, has to turn to the best account the simpler materials of brick, terra-cotta, and what is known in England as half-timber construction. Now, the economical and artistic treatment of these materials forms no part of the curriculum of study in foreign schools; if brick is used it is employed decoratively, and not as the elementary means of construction. It is in the employment of these materials, and their artistic devolopment, that the English architect has made that extraordinary progress to which I have already alluded.

It will suffice if I draw attention to one example in London,—the Regent's Park Lodge, by Mr. W. Eden Nesfield,—and ask you to compare that building with any of the hundred and more villas of the better sort which have sprung up round Paris, at Auteuil, Passy, and other places. The plan is about the same in both cases, and of square form: in the French villas the walls are all carried up to an equal height, decorated in various fantastic ways, and crowned with an ordinary pitched roof and an iron cresting. Mr. Nesfield, on the other hand, has by an ingenious arrangement of roof and the employment of bow windows, oriels, dormers, half-timber and tile-hung construction, created a world of artistic design, and at something like half the cost per cubic foot of the French stone villa.

Mr. Nesfield's design is a brilliant example of what I may call *material architecture*, in which the economic and artistic treatment of simple materials is turned to the best account. The French villas are examples of what I may call *paper architecture*, that is to say, designs which on paper with gradated tints look very well, but in execution are not only commonplace, but sometimes at variance with the proper and consistent use of the material. Now, I think that this is a very important consideration. You will remember that Victor Hugo in his novel, "Notre Dame de Paris," points out with remarkable sagacity the real cause of the decadence of modern art. Gazing from the printed book to the magnificent Cathedral of Paris, he puts these words into the mouth of one of his characters, "Ceci tuera cela, *le livre* tuera l'édifice." I may now go further, and turning from the elaborately-finished drawings of the present day to one of our ancient monuments erected when drawing materials were of the scantiest description, exclaim, "Ceci tuera cela, *le dessin* tuera l'architecture."

In these days of expert draughtmanship this is what we have to fear most, and the best advice I can give to students is to accustom themselves to measure and draw continually from old work, and not to take their ideas from pattern books. In this respect I consider that the late William Burges, in his admirable work on architectural drawing, has left us a book which may always be held up as a model of the kind of measuring and drawing which every student should pursue. His aim was not to make pretty and effective drawings, but to analyse and dissect ancient work, and thereby deduce the principles which governed its design. The good influence which Burges exerted in his lifetime was greater than that, I think, of any other artist; let us hope that the legacy he left in this work above alluded to will continue to exert that beneficial influence.

The following paper by Mr. Lawrence Booth, F.R.I.B.A., President of the Manchester Architectural Association, and President of the Manchester and District Society of Surveyors and Valuers, was read for him, in his unavoidable absence, by Mr. Herbert D. Appleton, one of the Honorary Secretaries of the Conference:—

THE INSTITUTE AND ARCHITECTURAL EDUCATION.

THE Institute having obtained, under royal sanction, enlarged powers, intended to increase its usefulness, there appears to be an implied obligation that no time should be lost in applying them to some practical purpose.

The primary object of this paper is to suggest how the authority and usefulness of the Institute could be increased by the adoption of an educational scheme, which, if successful in its working, would, within a few years, lay the solid foundation for an application to Parliament for those stringent powers of repression against all unqualified practitioners to which so many of us are inclined.

Hitherto the promotion of this latter project has induced some little friction between men who were practically agreed as to its desirability, because divided in opinion as to the opportunity of the time and circumstances under which it should be thrust forward.

Henceforth the several sections of the army can march in the same direction, and combine their forces for the attainment, ultimately, of common objects worthy of their best efforts,—the statutory recognition of the importance of the duties we are called upon to perform as architects, and plenary powers to prescribe and enforce a high standard of professional competency and moral rectitude on the part of those who assume to enter the ranks of the profession.

If this great work is to be achieved by and through the Royal Institute,—and it appears

hopeless to expect it from any other source,—the Institute will require to be strengthened both within and from without. How is this to be done?

In no way more surely and in no way more worthily than by a beneficent assistance, supervision, and direction of the educational efforts now being put forth by numerous local architectural societies on behalf of those who are honestly and industriously endeavouring to qualify themselves as proficient architects; and the stimulus which would, incidentally, be given to the formation of numerous combinations for similar purposes in districts which are at present apathetic, if not absolutely antagonistic to the Institute's pretensions.

The writer's sympathy and observations are the result of a somewhat lengthened experience of the isolated efforts of provincial societies, and they may not, therefore, secure the complete acquiescence of metropolitan brethren, who are in more immediate "touch" with the Institute and other educational resources.

But if the Institute would only assume its proper position as the Alma Mater of the whole profession, receiving and distributing valuable assistance without distinction or favour, it would at once become apparent that the provinces are capable of giving, as well as receiving, something substantial for the general good.

One example in illustration. It is probable that in the matter of taking out quantities, measuring up and pricing builders' work, and writing a specification, an average architectural student in the provinces would far outstrip his metropolitan brother; and although the varying custom in metropolitan and provincial practice may differentiate the value of such knowledge, it will hardly be denied that it is in itself desirable, if not absolutely essential, for the proper equipment of an architect who assumes to watch over and guard the financial interests of his clients, even if its exercise should be confined to supervision only.

The writer is within his experience in mentioning several "pupils" fairly possessed of such knowledge and capable also, and at the same time of surveying and levelling, or making a perspective drawing, and all with equal facility.

His purpoee is, however, not to stir up strife, but rather to bring about a spirit of friendly emulation, and an impartial recognition of meritorious work in whatever branch or branches of the profession it may be exhibited.

Some of the artistic excellence displayed by those who are nearest to the "light" might well be exchanged for some of the practical knowledge possessed by the outsiders, to their mutual advantage.

A proverbially dangerous word of prophecy in passing:—If the practice of the architectural profession is destined to become a close one under statutory enactment, and whether the Institute is to hold the key of entrance or not, the "Open Sesame" will not be either artistic or linguistic attainments, but rather a thorough knowledge of sanitary science and construction; because the public, our masters, are daily becoming more convinced of the fact, which is a fact, that such matters are to them a question of life and death.

No more useful hint could be given to the "rising hope" of our profession than the importance which will in the future attach to this branch of the architect's responsibility, and those who apply themselves to its consideration will in any event have their reward in the approval and patronage of a discriminating and recently-enlightened community.

Either by federation or affiliation,—the name is not of much importance if only the object be secured,—every available ray of professional light should focus to the Institute as a centre to be thence distributed for the guidance of those especially, our destined heirs and successors, who are in their present isolation mere pilgrims of the night.

In the writer's earlier experience the Institute was little more than a superior kind of office for the registration of the fact, sometimes doubtful, that N or M had, without any cause for a feeling of gratitude to the registry office for help received therefrom, established himself as a well-known practising architect, able and willing to pay his admission fee, and likely to continue the payment of his annual subscription for the privilege of appending a few mysterious letters to his signature, the significance of which the general public have not, even yet, been sufficiently educated by observation and experience to comprehend.

A considerable advance in the right direction has been made since then; and the road is now clear for one of supreme importance.

Let the Institute, like a true, fostering mother, henceforth seek to secure the affection of its children by *early adoption*, and such acts of kindly and timely help in their juvenile efforts as will make them, when arrived at manhood's estate, the firm adherents and the staunch supporters of its best traditions and interests.

Every architectural student ought to have the chance of a recognised status in its ranks, to be obtained, in the first instance, by a preliminary examination as to his general knowledge and special aptitude for the work before him.

A second or intermediate examination should follow in due course, wherein he would be expected to give evidence of proficiency in technical knowledge and manipulative skill.

A successful pass at the third or final examination should entitle him to admission as an Associate; and in this and the other stages provision should be made for the recognition of exceptional ability by the grant of "honours."

The Institute would, of course, suggest the curriculum of study; and in its collective wisdom formulate the examination papers, which would be distributed simultaneously to the several provincial centres.

No enforced attendance of candidates in London for purposes of examination should be necessary; because effectual guarantees as to fairness could easily be provided under deputed authority and supervision in the provinces.

With a common standard of proficiency thus set up for our younger brethren, in their several degrees, there would soon be developed such a spirit of emulation on their part as could not fail to arouse the most lethargic student to exertion.

The facilities afforded by gentle guidance for graduating step by step, and without the necessity of having to make a journey or journeys to London for the purpose of being "plucked" or otherwise, would encourage and induce many a modest youth to try his luck near home, who would hesitate to ask, it may be, a widowed mother to equip him for what he might think a hazardous and costly experiment.

But above all, there would be opened out for the Institute itself such a sphere of beneficent educational administration as would enable it to justify even its regal title; and by exhibiting to the world a body of high-minded men unselfishly seeking to qualify those of their own "calling" as efficient and useful members of the community, it would assuage the doubts of those who, with an instinct pronouncedly national, might otherwise suspect in any application for the power of absolute control over the entry into the practice of our profession only an attempt at a selfish monopoly, or, in other words, a mere development of trade unionism.

The Institute would be raised immeasurably both in the public and in its own estimation, and would soon attract all that is worthy and desirable to its support.

More work would have to be done, but there would be more willing hands to do it.

Once place the education and training of students in the fore-front as one at least of the Institute's most important aims, recognised by it both as a privilege and as a responsibility, with equal earnestness, and there would be such an accession of numbers and strength as has not been either developed or even suspected to have an existence.

The transformation would direct the latent energies of those,—some inside and many outside the ranks of the Institute,—who are now simply looking on at a comparatively few well-known members engaged in writing papers at each other, to a field of much more useful work, in which they could do yeomen's service in giving the benefit of their practical experience, not to those who have too much, but in aid of the young, the hungry, and the deserving, thus realising the beautiful picture of the double blessing for the giver and the receiver.

Mr. J. A. Gotch, President of the Architectural Association, read the last paper of this series, as follows,—

LEARNING TO BE AN ARCHITECT.

Learning to be an architect is about as arduous a task as a young man can undertake; and yet in this country, at any rate, there is no task as to which less definite information exists for the young man's guidance. The only thing certainly known to be necessary is to article him somewhere,—to a friend, a relation, a cheap man, or a man in the nearest town, so that he is not far from home; but not by any means necessarily to a man who will make a good architect of him, though it by no means follows that none of the aforesaid could do so. And when he is articled, what does his apprenticeship do for him? In nine cases out of ten it makes him at the best an architectural practitioner; but as for being an architect,—with a desire to tread the higher and nobler paths of the profession,—very few offices make him that,—at least, provincial offices. If he can spend a year or two in another office, and can then settle down somewhere as an assistant, or perhaps scrape together a practice in his own town, learning as he goes along, his ambition is satisfied; for he has had no higher ideal placed before him, and if he reads in the professional papers of Travelling Studentships, or of Prizes for Designs and Essays, he regards them as wholly outside his province, and meant only for those lucky people whose parents live in London. It does not occur to him that he too might try his hand at design, for he has never been taught to do anything but grub along from day to day at his tracings, and his dull brick villas with Bath stone heads and sills and 6-in. bands by way of ornament. And as for travelling studentships, he hardly knows what purpose they serve, for no one has opened his eyes to the instruction, the interest, the poetry, and the never-ending delight which every village in his country-side holds out to those who seek it with intelligence and a desire to gain knowledge. From the force of circumstances, from the absence of any defined track to follow or of fixed goal to reach, he moves in a narrow circle, with no ideals, and no ambition beyond avoiding some disaster, which his scanty knowledge renders imminent several times in a twelvemonth.

No doubt the pupil whose lot is cast in a large town, and particularly in the largest of all towns, is more fortunate and less handicapped by want of guidance. If he gets little from his master, he has, at least, more friends of occupations similar to his own with whose help he is better able to struggle towards the light. But he, too, suffers from the absence of a defined track and fixed goals.

I take it to be one of the objects of this Conference to do something towards defining the track and fixing the goals. One such goal exists now in the shape of the Examination for admittance to the Associateship of the Institute, but this is, comparatively, far along the path of life, when the student has passed his youth and is entering into manhood. What we ought to do is to get at him at the outset, to give him a good start upon the track, and to let him feel that there is some one who has an intelligent interest in his welfare,—some one to whom he can apply for help in his needs and for guidance in his studies, and some one who will reward him for his exertions. This position must be filled by the Institute, which must first make known what advantages it will offer to those who seek its help, and then must define the conditions on which that help shall be given.

At the outset I think we must make up our minds that the Institute can at present be not a teaching body, but only an examining body. It can give a direction to studies and reward success in them, but cannot superintend them from day to day. If it can give the right direction to studies it will do a great service, for by its means energies now liable to be frittered away will be concentrated upon a definite end. But it must begin early enough. It must have an influence even upon school education, and this it can do by instituting a Preliminary Examination, the object of which shall be not to test the student's knowlege of architecture, but his general knowledge, which will be all the more useful if it has a leaning towards architecture. This present is not the occasion to define what subjects such an examination shall embrace, but it might include, in addition to ordinary school subjects, such as algebra, geometry, trigonometry, and conic sections,—one modern foreign language, elementary mechanics, drawing, and, perhaps, a certain amount of the history of architecture. Its object being, in fact, to make sure that the intending architect shall have a decent general

education before he applies himself to the particular pursuit of architecture.

This examination passed, the student is in touch with the Institute. To it he will look as the governing body of his profession; from it, and especially from its library, he will receive assistance; and for its prizes he will be able to compete. The advantage of thus reaching the student at the outset and of keeping a hold on him is obvious.

One goal, therefore, we have now fixed.

The next would be an Intermediate Examination, which might dispose of elementary matters in materials, construction, and history, and pave the way for the third goal in the shape of the Associate Examination.

By these means the interest of the student would be maintained throughout his course of study, and his studies would be concentrated towards a definite end; he would have a palpable series of objects to strive after, and he would have a certain amount of assistance afforded him in the process.

But, gentlemen, it is one thing to set up goals, it is another thing to provide the means of attaining them. As to the first or Preliminary Examination, if it were once established there is little doubt that plenty of schools would shape their course of study to meet it, for it would embrace little besides ordinary school knowledge. But once fairly committed to the profession and working for the Intermediate Examination, there exists at present no satisfactory guidance and no adequate agency to impart instruction. It is generally admitted that, however much the system of pupilage may suit our English character, it does not and cannot impart certain branches of knowledge which are becoming essential to the architect. It is true that in London there are many isolated sources for obtaining this extra-official learning, but they are not known to all; they are scattered here and there, they keep all sorts of hours, and no one has yet offered a clue to the labyrinth of their conflicting positions and times of work. Such a clue the Institute might certainly give, and I believe it is about to do so. That is to say, it will recommend to the student a course of study to be followed at one or more of the existing institutions, and no doubt that will be of the highest utility; in fact, it will be the most that can be done in the present state of things. But it will be a curious patchwork of an education, with a lecture here and a lecture there, extracted from courses which only touch architecture incidentally, and to which architectural students are admitted, as it were, by grace. However, if we grumble, let it be understood that we grumble not that other people do so much for us, but that we have done so little for ourselves. However, we are beginning to stir now. Our Supplemental Charter will give us greater scope, and it will be one great step towards improving our system of education if we establish such a series of examinations as has been sketched. It will bring the question into focus. There will yet remain the more difficult task of providing the agency by which the instruction necessary to meet these examinations is to be obtained. As a stopgap, the course of study to be followed at existing institutions will be of great use; but I for one shall hardly be content till the function now fulfilled on a voluntary system by the Architectural Association has devolved upon an authority recognised by the profession, and in a manner to reach not only students living in London, but those whose lot is cast in the obscurity of the provinces.

In the discussion which followed, Professor Roger Smith, Professor Aitchison, Mr. Stannus, Mr. John Slater, and other gentlemen, took part. We necessarily defer a report until next week.

On Wednesday evening, at 8 p.m., Professor Aitchison, A.R.A., presided, and

Mr. John Slater, B.A., read the following paper on

NEW MATERIALS AND INVENTIONS.

IN treating such a subject as new inventions connected with building operations and architecture before an assembly of practical men, it may be as well to state at the outset that there are three things which it will be impossible for me to do. First, I cannot attempt to notice all the varied new inventions which the last few years have brought to light; secondly, I cannot avoid describing some inventions which are not new to many here; and thirdly, I cannot help omitting some which, in the opinion of many persons, are superior in interest to those which I shall describe. All that I can hope to do is,—taking my own personal experience as a guide,—to bring before your notice certain comparatively modern inventions which have interested me either on account of their ingenuity or of their practical usefulness. It must be borne in mind that it takes a very considerable time before a new invention becomes so well known and its utility so thoroughly recognised for its use to become almost universal; and, moreover, no one has a right to recommend the employment of new methods simply because they are new: a certain amount of experience of them is necessary first, and this experience can only be obtained in time. I believe it is just twelve years since a paper on this subject was read in this room by Professor Roger Smith, and it is curious to notice that some of the novelties which he called attention to then remain almost novelties still,—so conservative are we in matters connected with building. Our cousins across the water are far more inventive than we are, and I have had to go to them for several of the novelties which I shall bring before you. The American intellect seems to take nothing for granted, to look upon nothing as final, and to bend its whole endeavours to find out some way of improving any mechanical operation which has for some time been in use. I think new inventions and discoveries are rarer in the domain of architecture than in other branches of industry, and for this reason: all new invention must be in a mechanical direction towards saving of labour, and as the best building has as much art about it as science, and as art cares far more for the variety obtained by individual effort than for the precision and exactness of mechanical repetition, architects (who, after all, exercise far more influence indirectly upon building than is sometimes imagined) are disposed to look somewhat shyly upon the facilities for doing away with individual labour, and to decry the reproduction of ornamental features by mechanical means. We are inclined to agree with Mr. Ruskin, and to prefer a tiny bit of carving into which the workman has put his head and his heart as well as his fingers, to any number of yards of machine-made moulding. And, within certain limits we are right in this preference. But when we turn from the purely artistic to the practical and scientific side of architecture, we cannot be blind to the immense advantages which modern scientific discoveries give us over our forefathers, and we should be foolish if we did not make use of them. Take, for example, the use of iron in building. It has completely revolutionised our methods and enables us to economise space and to erect buildings in positions where it would have been impossible to do so without its employment. And it is for the architect to take any new materials which assert their structural superiority, and to adapt them to artistic forms and treatment; and granting the requisite ability, I do not believe there is anything that cannot be "invested with artistic merit," to use a phrase which we heard a good deal of a year or two ago, even though it be so utilitarian and, to most of us, utterly detestable, as a cast-iron front to a warehouse.

My remarks this evening must necessarily be somewhat unconnected, for the reason that the inventions which I have to describe have little or no connexion with each other, but I will endeavour to work as much as possible upon the lines of our own specifications, that is from the more purely constructive to the decorative portion of a builder's work. We are all of us now so thoroughly imbued with the necessity of properly trapping and ventilating house-drains, and cutting them off from the sewers, that it is scarcely necessary to allude to these matters at all; but in connexion with sanitation there is one discovery that has been made comparatively recently that demands a word or two of notice: I allude to the unsealing of traps. It used to be considered sufficient, if closets were trapped, to ventilate the soil-pipe alone, but the experiments made in the United States, at the instance of the Washington National Board of Health, and in this country by Mr. Stevens Hellyer, have proved to absolute demonstration that unless the traps themselves are ventilated they will be liable to be unsealed. There are two ways by which traps can be unsealed,—first, by the momentum of any discharge passing through the trap itself; secondly, by the passage of a considerable quantity of water through a pipe with which the trap is connected. The passage of this water causes a momentary vacuum, by means of which the water is sucked out of the trap, and it is absolutely necessary, if the trap is to be a safe one, that all the trap branches into the main pipe should have an ample ventilating-pipe carried up from them and branched into the main pipe above the point where the highest trap branch enters it. This important fact cannot be too widely known, as it is certainly still the exception rather than the rule to have these branches ventilated. Before passing from the subject of drains and pipes, I should mention that increased experience all seems to point to the desirability of decreasing rather than enlarging the size of pipes; 4-in. glazed earthenware pipes for house-drains, and 3½-in. lead pipes for soil-pipes, if properly connected and laid, will suffice for all purposes, and will keep much cleaner than those of larger bore, always supposing they are properly flushed out. In fact, Mr. Hellyer has used soil-pipes of no more than 2½ in. diameter.

I do not think I need occupy your time in describing concrete as a building material, as there have been more than one evening in the last few years devoted to the subject, nor shall I attempt to enumerate the various kinds of ornamental bricks for walls which are now produced by various manufacturers of excellent quality and design. I will merely ask you to examine two comparatively recent forms of concrete paving,—Stewart's granolithic and what is called the "impenetrable" paving, both of which appear to me to be excellent. Terra-cotta also is so well known to all of you, and its usefulness as a building material is so thoroughly established that I need not detain you on this subject further than to mention a new form of nosing for stone or concrete steps invented by Messrs. Doulton. This is called the silicon tread, and is a kind of terra-cotta, *i.e.*, clay burnt as hard as it is possible to bake it. These treads were used for three years at the recent exhibitions at South Kensington, and must have had several millions of persons passing over them. There is one comparatively recent invention somewhat in the nature of brick, which is not, I think, so well known as it deserves to be. The impossibility of getting good fixing to ordinary brick walls has necessitated the use of wood bricks or plugs, which have two drawbacks,—(1) that they are liable to shrink, and therefore lose their hold on a wall; and (2) that they are certain sooner or later to decay. Mr. Wright has endeavoured, with much success, to get over this difficulty by making what he calls "coke-breeze fixing blocks." These are made of the same size as an ordinary brick, and can be built in the walls wherever required, and their constitution is such that they will hold nails as well as wood. For the purpose of fixing skirtings, dados, and linings of all kinds on the interiors of brick walls, I consider them admirable, and even more useful are they for external use if portion of a wall is to be hung with tiles. Every one knows how unsatisfactory wooden fillets are in such situations, as they are certain to get rotten before long, but these coke-breeze blocks are practically indestructible. Another method of using them is when wooden floor-boards are required over a concrete floor, as they obviate the necessity of bedding wood blocks in the concrete, a plan which never commended itself to my mind.

The next subject to which I shall ask your attention is that of fireproof construction. The enormous losses which such huge conflagrations as have been seen too often of late years in the city of London cause to the insurance companies have had the effect of making these companies exceedingly shy of insuring large warehouses except at very high rates of premium, notwithstanding their being what is called fireproof. The reason is that, practically, such buildings do not turn out to be fireproof at all. If the insurance companies could be convinced that a building were really and not theoretically fireproof from top to bottom, we may be quite sure that for their own sakes they would not decline the insurance; and it is well worth the while of those who are erecting these gigantic piles of buildings which we see around us to consider whether the sum that would have to be expended to bring about this result would not be, in the long run, a most wise economy. Iron and stone used to be considered fireproof

materials, but sad experience has shown the fallacy of this opinion time after time. In America the system of fireproofing has been carried much further than with us, and it is there laid down as an axiom that no building can be considered fireproof unless the whole of the structural ironwork used in it be covered with a real fireproof substance. I wrote to one of the largest firms in the States who make a special business of fireproofing, and asked for particulars of their practice,—the Wight Fireproofing Company,—and they were kind enough to send me an illustrated pamphlet from which some diagrams have been prepared. Some of the methods adopted do not differ widely from those in use in this country, such as Hornblower's system, but as the whole subject is one of great practical interest and importance I will endeavour to explain the American systems somewhat in detail. The first kind shows a combination of iron joists, concrete, and hollow fireclay tiles of different depths. The hollow tiles are temporarily supported by centering, and are set in cement, the middle tile acting as a key-stone. The bottom edges of the tiles are grooved, in order to give a good key for the plaster of the ceiling, and on the top of the flat arch thus formed concrete may be laid of any thickness that seems desirable, thus entirely encasing the iron girder. The weight of the deeper arch is about 35 lb. per foot super. In erecting a new building there is, of course, no difficulty in providing a floor of this kind, but if one has to deal with ordinary wooden joisted floors in actual existence, it would be a very expensive matter to replace them with iron and concrete floors. The next diagram shows a method of making wooden floors practically fireproof on the under-side. This is done by flat interlocking fireclay tiles carried by iron clips screwed to the joists, the underside of these tiles being grooved to form a key to the plaster. A space of 2 in. is thus left between the plaster and the wooden joists, and as the tiles themselves will stand almost any heat that can be brought to bear on them, the joists are absolutely protected; on the upper side fine concrete or pugging might be used. This system of fire-clay ceilings can be affixed to existing floors by simply hacking off the lath and plaster. I believe this system to be absolutely new to this country, and it appears to me both simple and effective. If iron columns are to be fireproofed, it is done by encasing them with fire-clay blocks, which are grooved and are secured by iron plates with claws, which fit on the rivet-heads. In circular cast-iron columns a metal band is brought round the column, hooked together, and dropped into the groove of the blocks. In either case a heavy bed of mortar is next applied, and then another course of blocks is bedded, or, as the Americans say, "crowded down" over the band or plate. This process is continued till the column is entirely encased, then it is plastered with Keene's or Parian cement, making a good surface for decoration. No words of mine are needed to show how much more perfect such a system as this is if thoroughly carried out than what we are in the habit of using here. Soon after I had obtained these particulars from the Wight Company, Mr. Doulton, of Lambeth, kindly sent me a notice of his new patent, the Doulton-Peto fireproof blocks. These are extraordinarily like the first kind of American arch blocks which I described; in fact, I believe the idea was obtained from the American system, and I have no doubt that Mr. Doulton will carry this system further in the way of casing columns, &c. I do not think, however, he has as yet manufactured anything like the flat tiles for wooden joists. I am not going to occupy your time further on this subject of fireproof floors, except to call your attention to an English system, whose merits I estimate very highly; I allude to Lindsay's steel decking, of which I have a model here. This consists of a series of steel troughs riveted together and supported either on walls or on girders, and filled in with concrete. The strength and rigidity of the small troughs are most surprising, and the small space which they occupy is even more astonishing, as for a space of 30 ft. the depth of the decking need only be 5 in. to support a load of 1½ cwt. per foot super. Another great advantage is that brick partitions can be placed on this decking and concrete in any position independent of walls or girders underneath. This flooring is largely used in the National Liberal Club.

With regard to this steel decking, it is a curious fact that many years ago a manufacturer, whose name I have forgotten, patented every form of corrugated iron which he thought could be manufactured, and left out the very one which has proved most useful. This form is based on the strictest scientific methods, as the top table is made thicker than the sides, and the sectional strength thereby greatly increased, and the various sections are riveted together at a point which is very close indeed to the neutral axis. The concrete used by Messrs. Lindsay is called by them pumice concrete, as it is very light and tough, and it is a good material for constructing roofs, domes, &c.

You will perhaps have noticed that I alluded to the wrought-iron columns of the Phœnix Company. Until the completion of the Inner Circle of the Metropolitan Railway, I do not think wrought-iron columns were much used in this country, but I believe their use will rapidly extend. We have been told for a length of time that when columns are beyond a certain length in proportion to their diameter, they fail by bending and not by crushing, and we also know that wrought-iron is much stronger to resist tension than cast-iron, and as it is an undoubted fact that connexions can be made to wrought-iron much better than to cast, we have here a combination of advantages where long columns have to be used which cannot but be appreciated, and which our American cousins are not slow to avail themselves of. Messrs. Lindsay have been on this tack for some time, and they have sent me here a section of their wrought-iron column, the strength of which is patent to all. The use of steel for constructional purposes is increasing rapidly, as it is so much more reliable than iron, and Messrs. Lindsay roll many sections of steel which can very easily be formed into columns by riveting. The safe loads which such columns will sustain are very great; for instance, a column made of a series of steel troughs, such as I have described, the total external dimensions being 16 in., would bear a safe load of 115 tons if 30 ft. long, and the weight would be 74 lb. per foot only. I have roughly calculated the weight, and the safe load on a cast-iron column 16 in. in diameter, 30 ft. long, 1½ in. thickness of metal; I find the weight would be 220 lb. per foot run, and the safe load 100 tons. I do not think the day is far distant when steel will have almost superseded iron for structural purposes.

Anything of the nature of fireproof material seems to me worth attention, and I will therefore briefly notice a substitute for wood lathing, either for partitions or ceilings, of which I have a model in the room. This consists of galvanised iron netting, which is fixed by staples to hoop-iron slips, which are themselves secured edgewise to the studs or joists. The wire netting is then covered with plaster in the ordinary way. The wooden framework of the partition may be replaced by a construction of angle iron, which takes up only half the space of an ordinary quarter or brick-nog partition, and this saving of space may sometimes be of considerable importance. The only thing that I am doubtful about is its permeability to sound; but, after all, ordinary partitions, or even brick party-walls, are, as many of us know to our sorrow, far from impervious to sound. I should say that a small structure formed by this iron lathing was severely tested about a year ago in Manchester, and the chief of the Fire Brigade reported very strongly in its favour.

Next to preserving the interiors of buildings from fire, one of the most difficult tasks is to preserve the exterior from the ravages of time and the weather, and it is, in fact, almost impossible to find a natural stone that will withstand the damaging effects of such an atmosphere as we have in London. In many parts of the country, too, beautiful old stone edifices are going rapidly to decay. The work of restoration of stone buildings is always difficult and expensive, but a means of doing this with comparative cheapness has been invented by M. Tabary, whose metallic cement has been extensively used on the Continent. This consists of a trachytic stone reduced to powder and then reunited by an acid without being decomposed. The material thus formed is permanent, and harder than the stone itself; it is not moulded, but carved to match any pattern exactly like stone, and the surface and colour can be made so precisely to resemble the original stone that the joint cannot be perceived. Mr. Blomfield and Prof. Lewis made a careful examination of several buildings in France where restorations had been made in this metallic cement, and they reported most enthusiastically of it, and since then Mr. Blomfield has used it in many of his restorations in England. I cannot help thinking that this invention ought to prove of enormous value, because it will enable us at a small cost to stop decay of the stone at the outset. With stone itself one always has to wait till a sufficient mass of the stone can be removed, because of the difficulty of adding small pieces to what is left, but this difficulty is now entirely overcome.

Many gentlemen who were present a few weeks ago at the reading of Mr. Crossland's paper on the Holloway College must have been much interested by the short notice which he gave of a system by which the pressure on the water mains of a building could be very largely increased at will in the event of a fire breaking out. The instances have been numerous in which, although the fire hydrants have been in perfect working order, considerable damage has been done through there being insufficient pressure to put out a fire before it has got beyond control. In London the pressure in the fire mains at the ground level averages from 25 lb. to 30 lb. per square inch, which is reduced one-half at a height of 35 ft. from the ground, i.e. the pressure diminishes as it becomes more urgently needed, because it is on the upper floors and at the roof of a building that water supply would be most effective. In order to remedy this it has often been thought necessary in the case of important buildings to erect a large tank at the top of a building or even to build a water tower at considerable expense, and even where a head of water of 144 ft. can be obtained the pressure per square inch in the mains is only 63 lb. Now the system which I have alluded to is the invention of Mr. Vinning, and is called the High-pressure Fire Hydrant system. It consists in connecting with the ordinary mains one or more closed steel tanks charged with water, which can be at any moment submitted to any desired pressure up to 100 lb. or 120 lb. per square inch. This pressure is maintained by a series of wrought-iron cylinders filled with compressed air by means of a small air-pump or by other means, and kept permanently at the required pressure. These cylinders can be placed in any convenient position at a distance from the water-tank, and are connected together by small pipes so as to form practically one vessel, the bottom of which is connected by a small air-pipe about ¾ in. internal diameter with the water-tank. The means for throwing the apparatus into use is a strong valve, which, when shut, confines the compressed air to the cylinders, but by turning the handle the valve is opened. At the base of the water-container there is a large float ball-valve which closes the access to the mains as soon as the water is discharged, and thus prevents the air entering these mains. The water-container can be made of any required size, but for a large building it would probably be preferable to increase the number rather than the size of the containers. It is calculated that a vessel containing 2,000 gallons would give, with ordinary-sized pipes, a delivery of 50 gallons per minute for 40 minutes, and as the extinguishing power of water is much increased by very high pressure, this amount would generally suffice for the suppression of a large fire. Of course, after once going off, the air-cylinders require re-charging, but an air-pump is not absolutely indispensable, as steel bottles containing air at a pressure of over 1,500 lb. are now prepared, which can be carried about to any extent. Mr. Vinning is now engaged in putting up this apparatus at the South Kensington Museum, by order of the Science and Art Department.

While on the subject of water-pipes, I should like to call your attention to a very beautiful invention which again comes from the other side of the Atlantic. Everybody is familiar with the corrosive action of water on metal pipes, and, in some cases, very serious effects upon health have resulted from the combination of certain chemical constituents in the water with the material of which the pipes were composed. But I have here some glass-lined pipes, than which nothing could be more cleanly, and they can be made to any bend that may be desired. These pipes have been patented for some few years, but there was found considerable difficulty in making the joints sound; this has, however, now been overcome, as the joints are all ground by an emery wheel,

and special washers are used, and I think there ought to be a great future before this invention. In addition to these pipes being non-corrosive, it has been found practically that it requires a much more severe frost to congeal the water in these pipes than in ordinary metal ones. This is due partly to the packing and partly to the bad conducting power of the glass. These pipes can be jointed with much greater ease and speed than lead pipes, and when this is taken into account, their cost will be hardly any more than lead pipes. For breweries, acid works, and other places where ordinary pipes are soon destroyed, these glass-lined pipes will be most useful.

As land increases in value in London and other large cities, the tendency is to increase the height of all business premises, and thus gain more room. We see this in the new warehouses which are constantly being erected, but we do not go anything like so far in this direction as they do in the States, where buildings of ten stories are not uncommon. These high buildings would be comparatively useless without a very complete system of lifts, and the one to which I shall call your attention seems to me to combine, in a high degree, mechanical skill, ease in working, and safety. You are of course, aware that elevators may be divided into two main classes,—those in which the cage is suspended, and those in which it is fixed at the top of a ram, which is generally worked by hydraulic machinery. Ordinary suspending tackle answers very well for goods-lifts, but there is considerable risk in relying upon it for passenger-lifts, even when provided with safety catches, and, in fact, in many Continental cities suspended passenger-lifts were absolutely forbidden. With hydraulic-ram lifts, of the usual construction, it was necessary to excavate a chamber for the ram of the full height of the working of the lift, and in the case of hard soils, such as rock, this would entail very great expense. One method of overcoming the difficulty was devised by Messrs. Stevens, who formed their ram in a series of cylinders, working one inside the other; but I am not able to state whether this principle has been found to answer well. The Otis elevator is a suspended lift, worked by hydraulic power, but the arrangements are such that I believe it to be absolutely safe. The cage is carried by four iron wire ropes, which pass to a wrought-iron yoke, and then, dividing into two pairs, are carried down to two timber beams, upon which the frame of the cage stands. The wire ropes pass over a guide pulley, and also over a loose pulley, and are fastened to a strong beam at the top of the building. The ropes are not connected directly with the cross-beams, but with a balanced lever-beam, the action of which I shall refer to again.

The framework of the cage carries gun-metal guides, which slide on each side of the timber uprights. The motive power is water, but no excavation for a ram is required, as the cylinder and piston which constitute the driving power can be fixed on the ground bed. By the intervention of the loose pulley just mentioned, the ascent or descent of the piston in the cylinder for any distance lowers or raises the cage just twice as much, and there would of course be no difficulty in increasing the mechanical advantage by the use of more pulleys. [The action of the lift was explained by means of diagrams.] Now, everything depends upon the safety appliances of such an elevator as this. The causes of danger are three: first, breaking of the supporting ropes; second, too rapid a descent in consequence of heavy weights; third, The counterweight carrying up a lightly-loaded cage higher than is intended, and thus breaking the connexion with the flanges. The latter was the cause of the accident at the Grand Hotel, Paris. As the cage is in itself slightly heavier than the counterweight, the latter accident cannot happen; and even if it could, and the piston-rod were broken, the only tendency would be for the cage to fall rapidly, and this cannot occur. In case of the breaking of any one rope, the balance-beam is acted on, and a wedge-grip is brought into action on both sides of the lift. If all the ropes were to break, and the cage were to commence to hurry to the bottom, a second safety device is provided which comes into play as soon as a certain speed is attained, and this brings the wedges into play at once and stops the descent of the cage. As soon as these wedges have acted, they cannot be released except by raising the cage. I believe, however, that no case is known of all the ropes breaking. It is important to notice that the mere stretching of one of the ropes affects the balance-beam, and thus advertises itself to the attendant, who must at once see what is the matter with the ropes, and properly adjust them. I believe that experience has proved that the wire ropes made by the American Elevator Company last, on the average, five years.

Another important point to be noticed is that this lift can be worked at a very low pressure, say 40 lb. to the square inch, whereas other hydraulic elevators require a very high pressure, that would have been almost impossible to obtain a few years ago before the introduction of the hydraulic power system of high-pressure mains, where pressure up to 700 lb. per square inch can be obtained. This is not the place to enter upon a discussion as to the relative merits of low and high pressure, but no notice of modern inventions would be complete that did not include this most valuable system,—in the starting of which our late President, Mr. Whichcord, took very great interest,—by which hydraulic power can be laid on to any building in London from a central station.

To turn to a very different subject, viz., heating, I should like to say a few words about a new stove which has come under my notice and which I have lately introduced into one of my buildings. This is the invention of Mr. Lofts, of Cambridge, and acts upon the principle of giving as large an amount as possible of radiant heat, by compelling the smoke and heated air to take a circuitous course, warming a large surface of metal before it goes up the chimney. It thus differs from the majority of improved stoves which have been manufactured of late years, and which for the most part rely upon warming a large amount of air and causing it to enter the room. Several tests of this stove have been made, and its economical consumption of coal has been clearly established.

It has probably been the lot of some of us to have to design buildings for clients in whose eyes economy is a virtue far exceeding artistic effect, and I believe it is not an unknown proceeding to be obliged to go through the drawings and specification with a builder in order to reduce the estimate. I have known cases in which an architect has been at considerable trouble to design a staircase, and to put a little of what is known as "feeling" into his balusters, &c. These are precisely the features which a builder will pitch upon with the remark, "There's a lot of work in that staircase, sir; I can get some very nice turned balusters that will look quite as well as this, and not cost half so much," and your staircase looks just like any other speculating builder's. Some very great improvement have been in turning machinery lately, and balusters and newels can be got now "square turned." I confess I do not know how it is done, as I believe the machines are kept in jealous seclusion, but I have some specimens of square-turned balusters which will give you an idea of what is, at any rate, a little variety from the ordinary run. These have been kindly lent me by Messrs. Carter & Aynsley, of Bishopsgate-street. I must not be understood as in any way approving the design of these, but the fact that it is possible to turn things square was quite unknown to me a few months ago, and I thought it might be of interest to this meeting to know that such a thing is possible.

In connexion with house fittings I would call attention to Kaye's locks, several specimens of which are on the table. The simplicity of construction of these locks seems to me very commendable, and they have given great satisfaction in cases where I have used them. I would particularly call attention to an automatic cupboard lock.

Among decorative appliances I may mention Radeke's compressed wood pulp, which has been used to some considerable extent abroad, although it has not found its way at all largely in England. Some kind of composition is used as a basis, and is laid on a thin veneer of any kind of wood, such as oak, walnut, &c., and the whole is then compressed by hydraulic power into moulds, which can be made of any required design, except that it is impossible to have deeply under-cut mouldings. The grain of the wood is excellently preserved, and the effect of the finished product as a means of wall decoration is certainly good. I believe it can be treated in all respects as wood, viz., cut, sawn, or planed.

Artificial illumination is a subject that has attracted great attention during the last few years, and the threatened rivalry of electricity has given a strong impetus to the improvement of gas-burners, in order to obtain more perfect combustion. Among these I may mention the Albo-Carbon light, the Wenham lamp, Sugg's Cromarty burner, the Siemens regenerative gas-burner, and the Welsbach incandescent lamp, which latter consists in the combination with the gas flame of a thin cylinder of some refractory substance which glows at a white heat. Although electricity has not ousted gas from the field, as it was at one time thought it would do, it has yet made more progress than many people imagine, and no architect would now think of designing a theatre, music-hall, hotel, or restaurant without fitting it with incandescent electric lamps, which do not give off as much heat as gas, and,—more important still,—do not contaminate the atmosphere. The invention of storage batteries as a sort of buffer between the machine and the lights, and as a means of avoiding the risk of breakdown of the engine, did much to render electric lighting more generally available, and considerable improvements have been made in these storage batteries during the last few years. In the earlier forms of storage battery,—for instance, the Faure-Sellon-Volckmar type, which is most largely in use,—there is always a certain amount of local action going on between the lead plates; but in the battery of the Union Electrical Power Light Co., which they have been kind enough to lend me to-night, there is no local action at all. The elements consist of solid slabs of peroxide of lead and plates of spongy lead, and are immersed in dilute sulphuric acid. The peculiarity of the peroxide plates is that the material used in its construction causes it to set into a perfectly hard and durable form, so that it is not injured by transport. The size of the plates is 7 in. by 4 in. and the total weight of the cell complete in a case is 20 lb. 11 oz. only. This lightness is achieved partly by the plates being loosely held by strips of celluloid, which material is also used to cover the strips of platinum by which contact is made. The elements are connected together by platinum wires dipping into small wells of mercury. Professor Forbes made some very careful tests of one cell of this battery, and obtained a discharge of about 8½ ampères for nearly fourteen hours. He also reported that the efficiency of the cell was between 80 and 90 per cent. The cells are contained in small wooden boxes, which are readily transported from place to place. When the elements are exhausted fresh ones can be supplied, and the old ones recharged, but spare plates can always be kept ready for use at any time. A battery of fifteen cells will run twelve ten-candle incandescent lamps, and occupies a few feet only. The recharging of the plates must of course be done by a dynamo machine.

While on this subject, I must mention a small primary battery and lamp combined, which will enable any one to have an electric lamp on his table at any time, and which can be recharged by simply pouring into the cell containing the plates the necessary liquid. These lamps are made in very ornamental cases, and one of the size here will run about three hours, *i.e.*, during the continuance of dinner; but if a larger size were adopted, they would, of course, last longer.

I now come to a subject which cannot be called in any sense an invention, but it is a discovery of very great importance as affecting the strength of materials, and although it affects engineers more than architects, I think we ought to be acquainted with its main features. For a considerable period it was considered sufficient to ascertain, with more or less exactness, the ultimate tensile or compressive strength of a timber beam or an iron bar, or any such material subjected to stresses or strains, and then to take a certain factor of this ultimate strength as a fairly safe working strength. But so long ago as 1870 a German engineer, named Wöhler, made a very large number of experiments which showed conclusively that the breaking strength of any material depends not so much on the statical load, but on the *extreme variations* of load which the piece has to undergo. For instance, taking 45,000 per square inch as the average breaking tensile strength of wrought iron, a rod which would be subjected to a steady load of 90,000 lb. ought to have a sectional area of 8 square inches,

using a factor of safety of 4; but if, instead of the steady load, the rod would be subject to alternate changes of load varying from 10,000 to 90,000 lb., its sectional area would have to be 11¼ square inches. If the same rod were subjected to alternate compression and tension it would require to be even stronger. Wöhler expresses this law as follows: the fracture of a material can be effected by variations of stress repeated a great number of times, none of which reaches the breaking limit, the difference between the extreme stresses determining the breaking strength. Wöhler's experiments were purely empirical, and their results have considerably exercised the minds of scientific men, but another German, Professor Bauschinger, of the Munich Polytechnic School, has been carrying on for several years a most exhaustive series of experiments, the result of which are published in a series of memoirs to which Professor Unwin was kind enough to call my attention, and of which he has published a short *résumé*. The puzzling anomaly of Wöhler's experiments lay in the fact that when subjected to alternate tension and compression a bar broke down at a stress lower than its elastic limit, and Bauschinger thinks he has discovered the explanation to be that in many materials the elastic limit has been raised artificially in the process of manufacture. I have not time to pursue this question further, but one illustration will show how it may effect our work. In an iron roof of ordinary construction, in which the pressure on one of the struts under ordinary circumstances is 1,500 lb., a heavy gale of wind would just double this, and this variation of pressure would reduce the ultimate strength of the strut nearly 20 per cent.

Professor Bauschinger has also carried out a large number of most careful and elaborate experiments on the behaviour of full-size cast-iron columns and wrought-iron stanchions, under the influence of heat and sudden cooling, and he found that cast-iron did not warp so much as wrought, but that if cast-iron was heated to a certain point and then had a stream of water directed on it it bent so much that it broke in two. He has also experimented on piers of stone and concrete, and comes to the following general conclusions:—(1) That no natural stone will withstand fire, but that granite did so the best; (2) that brickwork behaved much better than any stone; and (3) Portland cement concrete was best of all. It is impossible to give any idea of the exhaustive and minute character of Professor Bauschinger's experiments, and he is, I believe, still continuing them, and their results must have a very important bearing upon our knowledge of the strength of materials.

The experiments from which the formulæ for the strength of timber beams, joists, &c., were deduced, were in almost all cases made on very small pieces, and it has been a pure assumption that large pieces would behave in the same way. During the last few years a number of experiments have been made in the States, chiefly by Mr. Lanza at the Massachusetts Institute, on full-size pieces of timber; the results show that our ordinary formulæ require considerable revision. For instance, a spruce beam 12 in. by 2 in. by 15 ft. long, broke with a central load of 5,894 lb. According to Tredgold's formula, it ought to have supported a load of 8,928 lb. before breaking. This result was corroborated by other tests, and the general conclusion arrived at is, that whereas we have been accustomed to use as a constant in the familiar formula $W = \frac{c\,b\,d^2}{l}$ 4 cwt. for fir or pine beams,—in fact, in one of Tredgold's examples 530 lb. is used,—we ought really to use a constant of not more that 2¼ cwt. The more thoroughly large size specimens, whether of wood or iron, are tested the more will our knowledge of their strength be increased, and we shall be less dependent upon theory.

In conclusion, I will only say that one most important discovery has been made in the last few years to which I have not yet alluded, and that is that one necessity for an architect is a thorough education, and the result of this discovery must have very far-reaching effects on our profession.

In the discussion which followed Mr. Slater's paper the following gentlemen took part, viz., Professor Babcock, Professor Kerr, and Messrs. Woodward, Neville, W. White, Hall, Smallpeice, Doulton, Seddon, and Gibson; but our report is necessarily deferred till next week, when we shall detail the further progress of the Conference. We may, however, here briefly mention the order of proceedings:—

Thursday, May 5th.—11 a.m. Visit to the City and Guilds of London Institute, Central Institution, Exhibition-road.—3 p.m. Conference Meeting (Mr. John Holden, Fellow (Manchester), in the chair). Discussion of the Report of the Special Federation Committee, R.I.B.A., prior to its consideration by the Council.*—9 p.m. Conversazione of the President and Members, R.I.B.A., held by permission of the Lords of the Committee of Council on Education at the South Kensington Museum.

Friday, May 6th.—11 a.m. Visit to the Drainage Works of the Houses of Parliament.—3 p.m. Conference Meeting (Professor T. Roger Smith, Member of Council, in the Chair). Short Papers on the "Registration of Architects," by Mr. Charles Aldridge (Liverpool); Mr. G. W. Connon (Leeds); Mr. David Thomson (Glasgow); Mr. E. T. Hall, and others.—8 p.m. Ordinary Meeting of R.I.B.A., for the Presentation of the Royal Gold Medal to Mr. Ewan Christian, and for presenting the Institute Prizes. The President, who will take the chair, will deliver an address.

Saturday, May 7th.—11 a.m. Visit to the new rooms of the National Gallery.—12 noon. Visit to the Diploma Gallery, &c., of the Royal Academy, Burlington House, Piccadilly.—7 for 7·30. Members' Dinner, at the Freemasons' Tavern.

STAINED GLASS.

Great Barr (*near Birmingham*).—Another Munich window, by Mayer & Co., has just been placed on the north side of the Parish Church of Great Barr, near Birmingham. It consists of two lights, through which is represented the "Presentation in the Temple," and it has been erected "In memoriam Mabel Augusta Jaffray, died 1886."

Kingston (*near Taunton*).—A stained-glass window has just been placed in the west end of the north aisle of the parish church of Kingston, near Taunton, in memory of the late Mrs. Gale. The subject is a copy of Holman Hunt's picture "The Light of the World," and it has been executed by Messrs. Payne & Green, of London.

Leigh (*Essex*).—A window in painted glass, designed and drawn by Mr. Wm. White, F.S.A., has been placed in the north wall of the church of Leigh, Essex, as a memorial to Bishop Eden. In the centre light is a figure of St. Andrew, and in a medallion beneath is a small ship. The inscription at the bottom is as follows:—"To the glory of God and in grateful memory of Robert Eden, Bishop of Moray and Ross, Primus of Scotland, formerly rector of this parish sixteen years. He presented to Bishop Edward Field, of Newfoundland, a church mission ship, the *Hawk*. He deceased August 26, 1886, aged 82 years. Also in memory of Emma, his wife, who deceased March 24, 1880, aged 77 years."

Manchester.—The *Manchester Guardian* says that it is proposed to celebrate the Jubilee year of the Queen, and at the same time perpetuate the memory of the late Bishop Fraser, by erecting in the Albert Memorial Church, at the western end, a stained-glass window. Messrs. Hemming & Co., of Margaret-street, London, are to be entrusted with the execution of the work, which has been designed by the curate, the Rev. W. J. Mooney. The window will contain the royal arms and those of the Prince Consort, also the arms of the See of Manchester and of the late Dr. Fraser. The illustrations are of scenes in the life of St. Paul. The cost of this *in memoriam* work will be about 250*l*.

Oldham.—A new chancel window in St. Mary's Church, High Crompton, has just been unveiled. The work has been designed and executed by M. J. B. Capronnier, of Brussels.

Wiveliscombe.—A stained-glass window, executed by Messrs. Clayton & Bell, has just been erected in the north aisle of the parish church of Wiveliscombe, by Miss Pocock, in memory of her late parents.

---

* This report was printed *in extenso* in the *Builder* for April 23, p. 600.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

6,640, Water-closets, &c. J. Shanks.

The improvements embodied in this invention are mainly to limit the use of water while securing the full effective cleansing power of the same; an "after service" is arranged which with a wash-down basin completes the flushing. The distinguishing feature of the valve is a piston in the cover of the valve-box arranged to open the valve by diminishing the pressure on the outer side of the diaphragm.

6,943, Ventilating Rooms. E. G. Wright.

A tube with conical baffles is placed between the ceiling and floor, or behind the cornice. The ends of the apparatus are provided with inlet and exhaust cowls respectively; the cones by increasing the pressure attract the vitiated air quicker to the top of the room.

17,116, Damp Walls. E. C. S. Moore.

Portland cement is used as the basis of the patentee's system, and is applied on the inside of the building in two coats, afterwards covered over with a third coating of Parian or Keene's cement. The first coating is pure cement ¼ in. thick, and the second is mixed with sand one part in three, so as to exclude the damp. The condensation on the surface of the wall is prevented by the application of Parian or Keene's cement or plaster.

15,983, Kitchen Ranges. G. W. Courtier.

This invention relates principally to an oven attached to the range, and consists in making an inner casing of iron; so that when the oven is to be enlarged the casing can be drawn out telescopically, and the baking area thus increased.

1,758, Sash Fasteners. J. Harrington.

The object of this invention is to prevent the pushing back of the lever by a knife or blade between the sashes. An additional hinged piece of metal is fastened in such a way that it falls over the two sashes, and covers the junction of them for some distance to protect the lever of the fastener when the latter is bolted.

1,881, Fire Alarm. W. E. Heys.

This invention relates to a system of electric alarm with an automatic device for opening or closing the electric circuit.

NEW APPLICATIONS FOR PATENTS.

April 22.—5,847, H. Hagen, Chimney Pot for Smoky Chimneys.—5,848, J. Ditchfield, Water Taps for joining to Lead Pipes.—5,876, A. Barton & C. Arnold, Window or Sash Fasteners.—5,901, J. Doulton, Earthenware Blocks and Tiles.

April 23.—5,928, H. Richardson, Piercing or Boring Holes in Walls constructed of Brick, Stone, &c.

April 25.—6,021, A. Le Marquand, Sewerage or Drainage of Houses, &c.—6,027, A. Rhodes, Window Fastener.—6,038, G. Sharpe and Others, Cement for Plastering or Moulding.

April 26.—6,048, A. Smith, Fixing Door-handles to Spindles.—6,075, F. Tuerk, jun., and Others, Water Meters.—6,080, J. Eves, Water-closets.—6,108, J. Shoebridge, Window Sashes.—6,111, A. Dawes, Supplying Water to Water-closets, &c.

April 27.—H. Wake, Lowering and Depositing Concrete under Water.—6,137, S. Pickersgill, Open Fire-grates or Stoves.—6,152, W. Thompson, Portable Buildings.

April 28.—6,187, H. Longdon, Step Ladders and Trestles.—6,242, C. Clarke and F. Williams, Soldering Irons.—6,244, C. Clarke and F. Williams, Flushing Water-closets.

PROVISIONAL SPECIFICATIONS ACCEPTED.

3,390, J. McKee, Register Grates or Stoves for House Fireplaces.—3,404, S. Coombs, Frictional Door Check.—4,255, M. Syer, Syphon Water Waste Preventer.—4,321, F. Jarsuel, Door Locks.—5,310, E. Deacon, Locks, Catches, or Latches.—5,392, W. Brailey, Locks and Latches.—15,607, G. and M. Stowe, Bolt for Doors and Windows.—3,757, W. Pilditch, Adjusting and Hanging Doors and Casements.—4,544, J. Williams, Metallic Window Sashes and Frames.—4,598, S. Elliott, Metal Water Bars for Windows and Doors opening inwards.—4,615, R. Haddan, Brick or Block for Building Purposes.—4,689, W. Preussner, Artificial Stone.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

7,163, T. March, Horticultural and Other Buildings and Structures.—12,331, C. Swindell, Stove Grates, Fire Grates, or Fireplaces.—2,307, D. Doyen, Closing and Securing Doors.—7,069, W. Smeaton, senior, Flushing Water Closets, Lavatories, &c.—8,081, F. Morgan, Casement Fasteners.—8,593, J. Luke, Paper Floor and Wall Coverings.—12,174, T. Barnett, Register Stoves.—15,904, R. Davison and W. Creed, Wood Block Flooring.—3,850, J. Gooch, Shop Fronts.—4,244, A. Tourgée, Frames for Portable Structures.—4,427, D. Olinger, Hinge for Gates, Shutters, &c.